THE MOTOR TRUCK VOL III NO 1







IN LENTS

Motor Truck

Devoted to Motor Driven Business Vehicles of All Classes.

Vol. III

Pawtucket, R. I., January, 1912. N.S.E.

No.

Who Sells the Fleets?





The General Vehicle Commany has really 40% in a surprise to constitution of the formula interpretable and the desired continuers. For the Arthur Arthur contents, specially a service of 3.7.4 G. V. Seach.

Over one mallion deltas (\$1,000,000) counts of G. V. I letters are used in honor

We have been building electric trucks and tragenic once 1991 and man of the



result error in appealment from a great manufactor with the next few series that the electric consequence and participation of the November of the consequence of the consequence of the series for the present of a self-technical and deliberate.

The Co. V. Objects has the former processing of

The former of a complete continuous and open

Tunners of all as full models are independent and all ages of path models as one-plane all models ages of

After je tre not en degen

0000 10021 230 11111

You will find us to the Marin or pain three from their time of the land

GENERAL VEHICLE COMPANY

Works and General Office (10NG 18LAND CITY 5-1)

1 411 1 400

St State Street Williams

William Cont.

TO BUILD OF THE BUILDING



At the Madison Square Show

New York, January 15-20 and at the Chicago and Boston Shows



GASOLINE TRUCK BREWLRY BODY Model & Confedences Proc. (1) - Oc. \$1600



The prospective buyer of motor trucks cannot afford to consider a truck apart from the company that makes and sells it. If he is to get the maximum number of years' use from a truck—if he is to get the highest efficiency and the greatest economy in operation during those years—after the purchase must come service.

The first of the mark not of core, but of a company. G MC procks have belong them are manufactured technical state of the first of the

(CAC) — (a) the limit is provided or all characters and should be a few and Service Agreement of the provided of the Service Agreement and the control of the proclasser a principal service as the distribution of a material control of the proclasser a principal service as the control of a material control of the proclasser and provided or parts. In proceeding the control of the procedure of t

Where I is desired, a special service will be retained belone a sale or much in a shorough, and colored or any delivery or light as forestening.

H. You Woods Doubling a secondard near our version, and have each track a burnion measure on the whose, acted tracks field for a manufacture who will be able to the able to the fill over fellow as well as complete to consider the contract to the contract of the contract

The GMC too, one one passing and chap-

Inscream of our exhibits at the New York. Change and Boston Commercial Car Shows is invited, as a correspondence from prospective purchases, and dealers

GENERAL MOTORS TRUCK COMPANY

DETROIT MICHIGAN

Branches: New York, Chicago, Boston, Philadelphia, Kan, a Gity, Detroit

The The TRUCK Devoted to Motor Driven Business Vehicles of All Classes.

VOL. III.

PAWTUCKET, R. L. JANUARY, 1912

No. I

TWO NATIONAL TRUCK SHOWS IN NEW YORK.

Commercial Vehicle Display in Madison Square Garden Follows Week Devoted to Pleasure Cars---Power Wagons Share Interest at Grand Central Palace--
Accessories to Be Seen at Both Exhibits.

A T NO time in the history of the automobile industry have so many differing makes of commercial motor vehicles been assembled for the inspection of the business man as will be true during the two national shows in New York City this month. Considered in its brondest application, this means that never before has the prespective purchaser of power wagons had such opportunity to study the various offerings side by side, with every possibility of determining their respective merits, business man should make every sendency to visit the nicropoils during these displays. Fortunately, those respective merits of the property of the proper

their dates that this unparalleled array of models in the two largest buildings of the city will be open for inspection at the same time.

To not the matter in more concrete terms, it should be noted that during the National Association of Automobile Manufacturers' show in the Grand Central Palace, Jan. 10-17, and the Trade's display in Madison Square Garden, Jan, 15-20, there will be seen at least 66 different makes. This figure is hased upon the reports now at hand, but as is usually true, there is every possibility that this number will be

increased at the last moment. That this is the largest showing of commercial vehicles ever made is hased upon the fact that the most examprehensive precious display was that during the sound week of the Chieago skow last year, when 5.7 manufacturers were represented. Something over 40 were to be seen at the 1911 Boston show, and this exceeded the number displayed at New York (19) had January.

It may be mentioned that the exhibits of accessories at the forthcoming New York shows also will set a new record, 363 firms as against 304 for Chicago, and 320 for New York in 1911. The 11th hour additions in this field always are much larger than with the vehicles, and it seems safe to predict that the total will reach very close to 499. As many of these supplies, parts and fittings, have a first interest to the motor truck owners and users, it is anticipated that the accessory booths will prove quite as attractive to the business men as any other portion of the exhibitions.

While it may be considered that those directly concerned with power wagons will be less interested in the pleasure vehicles, it is worthy of note that the two New York shows will present at least 53 different makes of these. This number is but one behind that seen during the first week at Chicago last year, and exceeds the Madison Square Garden showing of 1911 by 23. The pleasure car show at

the Garden this year will be held Jan. 6-13, while these types will share interest with commercial vehicles at the Grand Central Palace Jan. 10-17.

Thus it will be seen, that beginning with Jan 6 and continging until Jan. 20. ample opportunity will be afforded to study the best productions of American manufacturers in all lines. For those who desire to devote the greater portion of their time to motor trucks, it is possible to reach the city during the latter part of the first week, comparing the offerings of pleasure cars at Madison Square Gar-



Madison Square Garden, New York City, Looking from the 26th Street and Functh Avenue Forner, Where the Automobile Board of Trade Shows Will Take Place Jan. 6-20.

den and the Grand Central Palace, and remain over Sunday to complete the inspection of power wagons during the early portion of the second week,

In one sense the tirand Central Palace exhibition is an overflow from Madison Square Garden. There is no rivairy between the National Association of Automobile Manufacturers and the Automobile librard of Trade, at least not in the same sense which has marked previous displays in New Parket and Parket Parket Parket National Parket Parket National Parket Parket National Parket National In the Madison Committee of the latter with a view to presenting the most representative showing of care, tracks and accessories possible. His 10 years' experience in managing the Chicago shows, as well as in assisting others in various sections of the country, is sufficient guarantee of success.

The new Grand Central Palace, which will house Its first automobile show in this exhibition, is a 13-story attracture on Lexington accure, two blocks north of the old huilding of that name. The three exhibition floors are particularly fitting to an admirable architectural creation. The above space is a rolonande with gallery for the first and second floors, and the third floor also is in the nature of a gallery, the great central court of the second floor being supported by pairs of massive columns on single pedestrias. There is less need of decoration than were it a single arcun, and the vehicles will be more prominent relatively.

Twenty-eight different makes of pleasure vehicles and of service wagons will be seen on the first floor. Six makes of pleasure cars and 35 of motor trucks will be shown on the second. The latter will include everything from the small package delivery wagon to the heaviest

truck, and with an almost endless variety of hody constructions. Accessories will be displayed on hoth the second and third floors.

Of the manufacturers who will be represented at this show, it is stated that no less than 35 makers of cars made no display in the meteopolis last year, and a large proportion will exhihit for the lirst time at any show. It hardly is necessary to point out that these exhibits will prove quite as interesting as those made by better known constructore

The Madison Square Garden display is in charge of Col. George Pope, Alfred Reeven and Merie L. Downs, representing the Automobile Itoard of Trade, All of these men have been identified with automobile shows in this building for years, and there can be little doubt that they have exerted themselves to produce results

which shall be even

more successful in every particular than at previous events. It is fitting that the display of machines shall have a setting of especial dignity, and yet it must be appropriate to the two divisions, the one for pleasure cars and the other for commercial vehicles. The decorations will be utiler for commercial vehicles. The decorations will be utile in keeping with this view, as indicated by an accompanying illustration. Vehicles will be shown on the main floor and two belouties, as san the case hast year, while arrived the control of the con

Promptly at 11 on the executing of Jan. 13, the pleasure car diction will come to an end, and immediately thereafter the exhibitors will begin the work of removing their cars. This applies only to automobiles and montroycles, since nearly all of the accessory makers will continue their distant through the second week. The plan is the same as that adopted has year, and it is anticipated that therewill be no delay in preparing the building for the second will be no delay in preparing the building for the second division, in which trucks will be the prominent feature, The truck exhibit will open at 10 in the morning of Jan. 15. Most of these vehicles will be housed on the maining floor, although the so-called elevated platform will be reserved for some of the lighter wagons and electrics. This will mean that it will be necessary to visit both floors in will mean that it will be necessary to visit both floors in will mean that it will be necessary to visit both floors in will be equally as complete as that during the first week, and there will be equally as complete as that during the first week, and there will be nothing to detract from the mature of the display.

With respect to the display of power wagons during the second week at Madsion Supare Garden, it should be said that there will be 26 makes of gasoline vehicles and ske electries. This statement is made battur in mind the information now at hand. Inasmitch as there are yet some two weeks hefore the show its scheduled to open there is time for the addition of other models. It is remembered in this convection that two of the best known manufacturers in this convection that two of the best known manufacturers of the hapituses whiteless have not been shown at previous displays. Inasmuch as the matter of hody design has at

tracted no little attention in the motor truck field during the past few months, it is expected that the various manufacturers will devote rather more thought to this detail than in past years. Information at hand concerning both exhibits leads to the conclusion that considrable effort will be made toward the presentation of types for special lines, And it is practically certaln that much can belearned concerning the possibility of adapting the various chassis shown for individual purposes. It is not probable that the manufacturers would allow the opportunity to pass for a careful study of this feature, and the huslness man who has special requirements in this line undoubtedly will find abundant means of acquiring knowledge of

this subject.

In short, the practicability of the power wagon having been estab-

reached a point where it is possible to devote much attention to the details of refinement in construction and design accessary to meet the varying needs of the user. The 66 makes on display in New York City this month will represent the hest productions of American engineering. This applies with equal force to both commercial and pleasure vehicles, and may also be said to hold true with reference

to accessories, justs, fittings and supplies.

On the following pages is presented a detailed list of
the exhibitors at both buildings. This not only indicates
where each make of truck may be found, but the pleasure
cars as well. The accessories have been classified according to the various lines, making it possible for the visitor
to lay bis plans for impecting that which he desires to see,
before leaving hume. In this connection the distarcas of
thor spaces should prove most helpful. It will be noted
that the various makes of cars and lines of accessories have
here arranged in alphabetical order. It is believed that this
plan will be thoroughly appreciated.



New Grand Central Palace, Lexington Avenue and Depew Place, Where the Show of the National Association of Automobile Manafacturers Will Take Place Jan. 10-17.

THE MOTOR TRUCK

MADISON SQUARE GARDEN EXHIBITORS.

COMMERCIAL VEHICLES

Alco, American Locomotive Com-

pany, Providence, R. L.

64Antocar, Autocar Company, Ard-

Astocar, Autocar Company, Ar-

Baker, Baker Motor Vehicle Company, Cleveland, O.

Bronx, Bronx Electric Vehicle Company, New York, N. Y.

Brush, Brush Runabout Company, Defroit, Mich.

Buick, Buick Motor Company, Flint, Mich

Cartercar, Carterear Company, Pontiac, Mich, 1084— Detroit Electric, Anderson Electric Car Company, Defroit, Mich. pany, Anburn, Ind. 15A-

Mack, Mack Bres, Motor Car Company, Allentown, Penn. 1954.

Morgan, Morgan Motor Truck Cumpany, Worcester, Mass

Packard, Packard Motor Cur Company, Detroit, Mich

Peerless, Peerless Motor Car Company, Pleyeland, O

Company, Cleveland, O.

2A.

Plerce-Arrow, Pierce-Arrow, Mo.

tor Unr Company, Buffale, N. Y.

Pope-Hartford, Pspe Manufacluring Company, Hartford, Conn 110A— Rapid, General Motors Truck Cumpany, Detroit, Mich

Heliance, General Motors Truck

PLEASURE CARS.

Alcu, American Locometive Company, Providence, R. 1

EP 106-American, American Motors Company, indianapolis, Ind.

pany, Indianapolis, Ind. EH 51— Amplex, Simplex Motor Car Company, Mishawaka, Ind.

Atlas, Atlas Motor Car Company, Springfield, Mass.

Springfield, Mass. EP 113— Anlocar, Autocar Company, Ard-

more, Penn. 11 213— Baker, Baker Motor Vehicle Company, Cleveland, O.

EP 112—
Brush, Brush Bunabout Company, Detroit, Mich.

MF 14— Bulck, Bulck Motor Company, Flint, Mich, MF 16—

Padillac, Cadillar Motor Car Com-



The Interior Decorations of Madison Square Garden for the 1912 Exhibition,

Garford, Carford Company, Eirria, O.

111AGeneral Vehicle General Vehicle Company, Long Island City,
N. Y.

N Y 115A-General Vehicle, General Vehicle Pempany, Long Island Phys. N. Y

Company, Long Island City, N. Y. 16A.— Grahowsky, Brahowsky Power Wagon Company, Betroit, Mich.

Wagon Company, Detroit, Mich. 144Hewitt. Metager Motor Car Company, Detroit, Mich.

Knox, Knox Automobile Company, Springfield, Mass.

71-

Lecomobile, Lecomobile Company of America, Bridgeport, Cons.

Louier, Louier Motor Company, Detroit Mich. 1924 — McIntare, W. H. McIntare ComCompany, Detroit, Mich.

Hen, Hen Motor Car Cummany.

Lansing, Mich.

17.4-Sampson, Alden Sampson Manu-

facturing Company, Betroit, Mich.

Speedwell, Speedwell Motor Car Company Daylon, O.

Stearns, F B Stearns Company, Cleveland, O

1014-Studchaker, Studchaker Automo-

bile Company, South Bend, Ind. 107AWard, Ward Motor Vehicle Company, New York, N. Y.

White, White Company, Cleveland, O. pany, Detroit, Mich.

4 58.... Carterear Carterear Company, Poullac, Mich

MF 2t-Chalmers Chalmers Motor Com-

pany, Detroit, Mich EP tie-Columbia, Columbia Motor Car Company, Hartford, Conn.

Company, Hartford, Conn.
EP 117—

Forbia, Corbin Motor Vehicle
Corporation, New Britain, Conn.

Corporation, New Britain, Conn.

B 206—
Daimler Daimler Import Company, New York, N. Y.

B 214— Initial! Electric, Anderson Elec-

tric Car Company, Detroit, Mich MP 23... E.M.F. Flanders E.M.F. Company Detroit Mich

EP 104Eleritt, Meisser Moior Car Company, Deiroit, Mich.

EP 195-

Umore Disore Mars for art a Conglete C

Dig unity Google

212-Flanders, Flanders Manufacturing Company, Pontiac Mich.

Franklin, H. H. Franklin Manu-facturing Co., Syracuse, N. Y.

Garford, Garford Company, Elyrlo O EP 114-

Haynes. Haynes Automobile Company, Kokomo, Ind.

Hudson, Hudson Motor Car Com-pany, Detroit, Mich,

Inter-State, Inter-State Automo-bile Company, Muncle, Ind. ED 111

Jackson. Jackson Automobile Company, Jackson, Mich.

EP 121-Knox, Knox Automobile Com-pany, Springfield, Mass. EP 115-

Lambert, Buckeye Manufacturing Company, Anderson, Ind. 10-

Locumobile, Lucomobile Company of America, Bridgeport, Conn

EH 110 National, National Motor Vehicle Company, Indianapolis, Ind.

ME Oakland, Oakland Motor Car Company, Pontlac, Mich.

202Ohio, Ohio Motor Car Company,
Cincinnati, O.

20.00 Oldsmoblie, Olds Motor Works.

Lansing, Mich. Overland. Willys-Overland Com-

pany, Toledo, O Packard. Packard Motor Car

Company, Detroit, Mich.

Palmer-Singer, Palmer & Singer Manufacturing Company, Long Island City, N. Y. 24 52 11

Peerless Peerless Motor Car ompany, Cleveland, O. 34-F:33

Pierce, Pierce Muter Company. Racine Wis 19-

Pierce-Arrow, Pierce-Arrow Mo-tor Car Company, Buffaio N. Y.

44 2012

Speedwell, Speedwell Motor Car Company, Dayton, O. **** **

Company, New York, N. Y. PD 102-

Thomas, E. R. Thomas Motor Company, Buffalo, N. Y. 215-

Waverley, Waverley Company, Indianapolis, Ind.

Winton, Winton Meter Carriage Company, Cleveland, O. MF

White, land, O. White Company, Cleve-

MF. Main Floor. EP, Elevated afform. B, Balcony. EH. Ex-Pintform. B. ACCESSORY EXHIBITORS.

Automobile Bodies *219

Haves Manufacturing Company, Detroit Mich Bodies bears and metal specialties.



Main Entrance to Grand Central Paince as Seen from the Main Hall, Looking Toward the East.

Lozier, Lozier Motor Company. EP 101.

Marmon Nordyke & Marmon Company, Indianapolis, Ind.

204-Murquette, Marquette Motor Car Company, Saginaw, Mich. BC12 120-

Matheson, Matheson Automobile Company, Wilkesbarre, Penn, MF IN

Maxwell, Maxwell-Briscoe Motor Company, Tarrytown, N. Y.

Meintyre, W. 11 McIntyre Com-pany, Auburn, Ind.

Mercer, Mercer Automobile Com-pany, Trenton, N. J. 31.25 12-

Mitchell-Lewis Motor

Company, Racine, Wis. EP 107-

Moline. Moline Automobile Company, East Moline, Ill.

\$112 X 1200 Moon, Moon Motor Car Company, St. Leulz, Mo.

Pope-Hartford, Pope Manufacturing Company, Hartford, Conn. EP 108-

Premier, Premier Motor Manufacturing Company. Indianapolis.

EP 116-Pullman, Pullman Company, York, Penn. Motor Car

MF 22_ Reo, Reo Motor Car Company. Lanslog, Mich.

S. G. V., S. G. V. Company, Read-

ing, Penn. MF 13-Stevens-Duryea, Stevens-Duryen

Company, Chicopce Falls, Mass. MF 6-Stearns, F. H. Stearns Company, Cleveland, O.

MF 3-Studdard-Dayton, Dayton Motor

Car Company, Dayton, O. EP 100-Selden Selden Motor Car Company, Rochester, N. Y.

Springfield Metal Body Company, Springfield, Mass. Metal automubile bodies.

American Ball Bearing Company, Cleveland, O. Hear axles.

534-Sheldon Axle Company, Wilkes-barre, Penn. Front and rear axles, lackshafts, etc.

Stutz Auto Parts Company, Indianapolis, Ind Stutz transmissions, etc.

Timken-Detroit Axie Company, Detroit Mich. Timken axles, etc.

**313-Turbenson tienr & Axic Company.

Bloomfield, N. J. 176-Warner Gear Company, Muncle, Ind. Warner transmissions, axies,

etc Warner Manufacturing Company, Toledo, O Axies, transmissions, gents, etc.

THE MOTOR TRUCK

Westen-Mott Company, Flint, Mich. Axles, rims, hubs, etc.

Ball Bearings,

Hantam Anti-Friction Company. Hantam, Conn. Anti-Friction ball bearings.

Barthel, Daly & Miller, New York, N. Y. Schafer bull bearings.

Heas-Bright Manufacturing Company, Philadelphia, Petit Ball bearings, ball bearing lubricants

Imperial Bearing Company, Detroit, Mich. Imperial bull bearlows.

New Departure Manufacturing Company, Bristol, Coun. Ball bearings metal specialities.

Rbincland Machine Works Company, New York, N. Y. Rhincland ball bearings.

R. I. V. Company, New York, N. V. R. I. V. ball bearings

188— 1 Hamond Chain & Manufacturing Company, Indianapolia, Ind. Diamond chains, chain cases.

mond chains, chain cases.

S. Hoffnung & Co., Ltd., New York, N. Y. Coventry chains.

228.
Link-Relt Company, Indianapolis, ind. Maximum stlent chains

Whitney Manufacturing Company, Hartford, Conn. Whitney chains, special machines, Woodruff keys,

Chains-Tire

Atlas Chain Company, Brooklyn, N. Y. Atlas tire chains.

Weed Chain Tire Grip Company, New York, N. Y. Weed the

Denionatable Hims.

American 18tm Company, New York, N. Y. Lambert 1868

*292________Buoth Demoustable Rim Com-

Electric Horas.

Automobile Supply Manufacturing Company, Brooklyn, N. Y. Newtons horns

Atwater Kent Manufacturing Works, Philadelphia, Penn. Monoplex horns.

Dean Electric Company, Elyria, O. Tuto electric horns.

Lovell-McConnell Manufacturing Company, Newark, N. J. Klaxon and Klaxonette horus

Typhoon Signal Company, Chiengo, III. Typhoon electric horns.

Electric Lighting Systems.

Detroit Electric Appliance Company, Detroit, Mich. Toaco dynanics and equipment.

Gray & Davis, Amesbury, Mass Gray & Davis Highting system. 2517— North, East, Electric Company.

North East District Company, Bechester, N. Y. Lighting and



Fayer and Main Entrance to Grand Central Palace at Lexington Avenue, Showing the Broad Statrenses.

8 K. F. Ball Bearing Company, New York, N. Y. S. K. F. ball bearings.

Standard Roller Bearing Company, Philadelphia, Penn. Thrust ball bearings.

Carbaretara

Byrne, Kingston & Co., Kokumo, Ind. Kingston carburetors.

Findelsen & Kropf Manufacturing Company, Chicago, III, Itayfield carburetors.

235.

Stromberg Motor Devices Com-

Stromberg Motor Devices Company, Chicago, III Stromberg carburetors.

Wheeler & Schehler, Indianapolia, Ind Schehler carburetura

Chains-Driving,

Baidwin Chain & Manufacturing Company, Worcester, Mass. Baidwin chains, spruckets. pany, t'leveland, O. Booth demountable rims.

233...

Dorlan Remountable Rim t'ompany, New York, N. Y. Dorlan remountable rims.

Newmastic Tire Company, New York, N. Y. Parker rims.

Drop Fargings,

liriggs-Seabury Ordnance Corporation, Sharon, Penn Brop forged and pressed sleet products

J. H. Williams Company, Brooklyn, N. Y. Drop forgings.

Western Tool & Forge Company, Breckenridge Penn Bron forg-

Dry Hattery Cells.

National Parbon Company, Cleveland, O. Polumbia stry cells nelf-starting systems.

Waid Leonard Electric Company, Bronxville, N. Y. Automatic dyname lighting systems.

*283--Willard Storage Battery Company, Cleveland, O. Elba lighting

Exhaust Horas

Gabriel Horn Manufacturing Company, Cleveland, O. Gabriel horns, shock absorbers

Company, Detroit, Mich. Autochimes, cut-outs, pedal valves.

Gaseline Storage.

American toll Pump & Tank Computy, Itayton O Grandine and inferent storage systems

190S. F. Hower & Co. the Fort Wive Int. Industry for and Judenant tunks at a proper

Hydraulic Oil Storage Company. Detroit, Mich. Gazoline storage system.

173-Janney, Steinmetz & Co., Phila-delphia, Penn. Fuel and lubri-cant lanks and pumps.

Wayne Oil Tank & Pump Com-pany, Fort Wayne, Ind. Gaso-line and lubricant storage sys-

ignition Devices.

Atwater Kent Manufacturing Works, Philadelphia, Penn, Unisparkers, ignition specialties, etc.

Briggs & Stratton Company, Mil-waukce, Wis. Timers, awitches, 154-

Connecticut Telephone & Electric Company, Meriden, Conn. Elec-trical and ignition devices.

field, N. J. Rustimore impos.

Labelennts

217-Columbia Lubricants Company of New York, New York, N. Monogram oils and greases.

Adam Cook's Sons, New York, N. Y. Albany greases.

Joseph Dixon Crucible Company Jersey City, N. J. Graphited greases, graphite compounds.

A. W. Harris till Company, Providence, R. I. Harris olls and greases.

Havoline Oil Company, New York, N. V. Havoline oils and

George A. Haws, New York, N. Y. Panhard olls and greases

257-International Acheson Graphite Company, Niagara Falls, N. V. Graphited oils, greases and com-

Magneton.

226-

| American Circular Loom Com-pany, Aldeno, N. J. No-Lag mag-

Bosch Magnete Company, New York, N. Y. Bosch magnetos and

ignition specialties. 244-Champion Ignition Company, First, Moch. Champion max-netos, spark plugs, etc.

Connectiont Telephone & Electric Company, Meriden, Conn. Con-nection magnetos and electric specialties.

216---Eisemann Magneto Company. New York, N. Y. Eisemann mag-

General Electric Company, Sche-nectady, N. V. Magnetos and nectady. N V electric specialties.

Heinze Electric Company Loweli, M.iss Heinze Heinze magnetos and



Section of the Main Hall, Grand Central Paince, Looking North Showing the Colonnade Effect and the Pairs of Decorative Pillars.

K-W Ignition Company, Cleve-land, O. K-W system of ignition. 024-

New York Coll Company, New York, N. Y. Ithondes unit spark York, N. Y. Ith Ignition system, Pfitsfield Spark Coll Company.

Dalton, Mass. Timers, switches,

C. F. Splitdorf, New York, N. Y Colls, switches, etc.

Lamps, Hendlights.

Bidger Brass Manufacturism Company, Kenosha, Wis. Solar head, dash and fall lamps.

181-Edmonds & Jones Manufacturing Company, Detroit, Mich. E. & J. head, dash and tall lamps,

129-Gray & Purks, Amesbury, Mass. Gray & Davis automobile jamps. lighting systems

Rushmore Everyno Works Plath-

Reystone fabricating Company. Philadelphia, Penu. Keystone ogia and greases

William P. Miller's Sons, Long Island City, N. Y. Pan-O-Lite edls and greases

New York & New Jersey Lubri-cants Company, New York, N. Y. Motorol oils and Non-Fluid

*521.... L. Sonnehorn Sons, New York, N.

V. Amalic oils.

Texas Company, New York, N. Y. Texco oils and lubricants INN_ Vacuum Oil Company, Rochester,

N. Y Mobileil White & Bugley Company, Wor-cester, Mass. Offzum oils and

*3113mm

Wolverine Labricants Company, New York, N. V. Packard offs and greases.

Herz & Co. New York, N. Y. Herz magnetos, spark plugs, ignition specialties.

252__

Jacobson - Brandow Company, Pittstield, Mass J-B magnetos and ignition specialties. 597

Marburg Brothers, New York.

Mea magnetor Mirls. Magnetos, coils and igni-tion apparatus.

Patrefield Spark Coil Company, imiten, Mass Fittsfield mag-netes, spark plugs, ignition spe-ciatities.

1 001-Remy Electric Company, Ander-son, Ind. Remy magnetos and electric specialities

C F Splittorf, New York, N Y Splittorf magnetes spark plugs and ignition specialties,

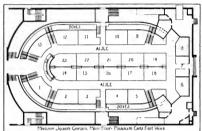
THE MOTOR TRUCK

Metal Specialties

Chandler er Company, Springfield,

Radistors.

A-Z Company, New York, N. Y. Radiators, sheet metal products.



Columbia Nut & Bolt Company, inc., Bridgeport, Conn. Lock nuts

100 -Hartford Machine Screw Comnuts and milled and turned parts.

Turner Brass Works, Sycamore Automobile tittings and hardware

Metal Tool Boxes, Etc.

*210---Haves Manufacturing Company Detroit Mich Metal battery and

Publications.

394-Automobile Journal Publishing Company, Pawtacket, R. I. Auto-toobtle Journal, Motor Truck, Ac-

resserv & Garage Journal 701-

Bieveling World Company, New York, N. Y

Chilton Company, Philadelphia, Penn. Cycle and Automobile Trade Journal, Commercial Car Journal.

Class Journal Publishing Combile

Class Journal Publishing Com-pany, New York, N. Y. Motor 207-

Horseless Horseless Age Company, New York, N. Y. Horseless Age,

Motoreyeling, Chicago, Ill.

Motorcycle Publishing Company, New York, N. Y.

+556--New Publication Company, New York N Y Motor.

Motor Vehicle Publishing Company, New York, N. Y J bile Dealer and Repairer,

Motor World Publishing Cam-pany, New York, N. Y. Motor World, **556__

Power Wagon Publishing Com-pany, Chicago, Ill. Power Wag-

Floor- Pleasure Caro First Week Briscoe Manufacturing Company.

Radiators, sheet

metal products *375-El Arco Radiator Company, New York, N. Y. El Arco radiators

+515 Fedders Manufacturing Com-pany, Buffalo, N. Y. Fedders

radiators. 220 4 --

Detroit. Mich

Harrison Radiator Company, Lockport, N. Y. Harrison radia-151mm

Met'ord Manufacturing Communy. Detroit Mich. Radiators, gaskets, fans, etc.

**504---W. J. Kells Manufacturing Company, New York, N. Y. Kells rollators

Roller Bearings

Bower Roller Bearing Company. Mich. Detroit. Bower roller bearings.

Standard Roller Bearing Com-pany, Philadelphia, Penn. Stan-dard roller bearings,

Timken Roller Bearing Company. Canton, O. Timken roller bear-Ings

Shock Absorbers

Arlatos Company, New York, N. Y. Mundex shock absorbers.

John W. Blackledge Manufacture ing Company, Chleago, Ill.

Ernst Flentje, Cambridge, Mass. Flentje shock absorbers. 150-

Hartford Suspension Company, Jersey City, N. J. Hartford shock absorbers and auto jacks.

547J M Shock Absorber Company,
Philadelphia, Penn. J M shock

J. H. Sager Company, Rochester, N. Sager equalizing springs, ete.

8 & S Shock Absorber Company. Washington, D. C. S & S shock *530---

Westen Manufacturing Company, Newark, N. J. Westen shock abnorh-ru

Spark Plags, Etc. 249-

Benford Manufacturing Company, Mount Vernon, N. Y. Stork plugs timers and ignition special 402-

Rest Ignition Equipment Com-

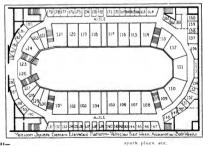
Hoselt Mag York, N. Y Magneto Company. Bosch spark plugs. 211 1'hampion

Isrottion Commany. Flint, Mich. Champlon spark - 815 6-

Duplex Magneto & Spark Plug Company, Brooklyn, N. Y. IX E Hardy Company, Phiengo,

spark plugs 425B

Herz & Co., New York, N. Y Herz



Hyatt Roller Bearing pany, Newark, N J. Hyatt roller bearings.

173-

January, Steinmetz & Co. Phila

Digitized by Google

Jeffrey, DeWitt & Co., Detroit, Mich, Reliance spark pluge, A. R. Mosler & Co., New York,

Peter A. Frasse & Co., New York, N. Y. Sheiby steel tubing,

Thomas Prosser & Son. New



N. Y. Spitfire, Triumph and Broochblock spark plugs. 167-

Pittsfield Spark Coll Company. Paiton, Mass Jewell spark plugs

C. F. Spiltdorf, New York, N. Y. Splitdorf spark plugs, etc.

Speedometers

Hoffecker Company, Bosto Moss. Hoffecker speedometers. Bouton

143-Jones Speedometer Company, New York, N. Y. Jones speedometers, recorders, gasoline gauges, hub odometers, live map meters.

Standard Thermometer Company, Boston, Mass. Standard speed-ometers.

* 405-Star Speedometer Company, Melton, Penn. Star speedometers.

Stewart & Clark Manufacturing Company, Chicago, III. Stewart speedometers.

123___ Veeder Manufacturing Company, Hartford, Conn. Hub odometers, cyclometers, tachodometers, counters, die castings.

Warner instrument Company, Beloit, Wis. Warner auto-meters, speed registers, etc.

Steel and leon Castings.

Isaac G. Johnson & Co., New York, N. Y. Steel and malleable iron castings,

Treadwell Engineering Company, Lebanon, Penn. Steel castings, electrically made,

Steels and Metals.

American Bronze Company, Berwyn, Penn. Non-Gran brunge products,

American Vanadium Company, Pittsburg, Penn. Vanadium metai products.

Carnegie Steel Company, Pittsburg, Penn. Special construction steels.

Crucible Steel Company of America, Pittsburg, Penn. Steel and special metals,

York, N. Y. Krupp steel products.

United Steel Company, Canton, O. Vanadium steels.

'nited Steel Company, Canton, O. Special steel alloys

311-Vanadium Metals Company, Pittsburg, Penn. Vanadium alloys,

Steel Stampings.

.271-Globe Machine & Stamping Com-pany. Cleveland, O. Hangers, brackets, etc.

Steering Genra,

Manufacturing Com-Gemmer Detroit, Mich. pany. gears.

*507-

Storage Battecies.

237

516-Dayton Engineering Laboratories Company, Dayton, O. Deico-ignition system.

Edison Storage Battery Company, West Orange, N. J. Edison vehi-cle and ignition batteries

Electric Storage Battery Com-pany, Philadelphia, Penn, Exide vehicle and ignition batteries.

*412 Geisgler Bros. Storage Battery Company, New York, N. Y. Geiszier batteries

Gould Storage Battery Company, New York, N. Y. Gould storage hatterles

Niagara Lead & Battery Com-pany, Niagara Falls, N. Y. Salom storage batteries.

**565.... Philadelphia Philadelphia Storage Battery Company, Philadelphia, Penn. Philadelphia vehicle batteries.

United States Lighting and Heating Company, New York, N Y. National lighting and ignition

batteries Vesta Accumulator Company Chicago, Ill. Vesta accumulators

Willard Storage Rattery Com-pany, Cleveland, O. Lighting and ignition batteries,

Tires, Tubes and Hims.

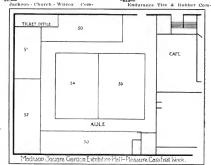
Ajax-Grieb Rubber Company, New York, N. Y. Ajax tires and

Batavia Rubber Company, Ba-tavia, N. Y. Batavia tires and tubes.

152Consolidated Rubber Tire Com-pany, New York, N. Y. Kelly-Springfield tires and tubes.

Continental Hubber Works Com-

Diamond Rubber Company, Ak-ren, O. Diamond tires and tubes. +413-



pany, Saginaw, Mich. Jaco steering gears.

Ross Gear & Tool Company, La-fayette, Ind. Steering gears.

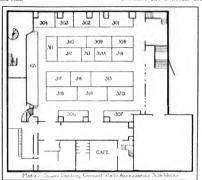
pany, New York, N. Y.

Firestone Tire & Rubber Com-pany, Akron, O. Firestone tires, tubes and rims.

THE MOTOR TRUCK

Fisk Rubber Company, Chicopee Falls, Mass. Fisk tires, tubes Falls, M

pany, Akron, O. Stein double cushion tires. 171 Swinehart Tire & Rubber Com-



999 Federal Rubber Manufecturing Company, Cudalcy, Wis. Federal tires and tukes.

170 Goodyear Tire & Rubber Com-pany, Akron, O. Goodyear tubes, tires and rims.

James L. Gibney & Bro. Philadelphia, Penn Hibney tires and vulen nivers

B F. Goodrich Company, Akron, O Goodrich tires and tubes,

+5.95 Hardman Tire & Rubber Com-pany, New York, N. Y

J Eliwood Lee Company, Con-shohocken, Penn. Jelco tires and tubes

Michelin Tire Company, Mili-town, N. J. Michelin tires, tubes

and rime. Mots Clincher Tire & Hubber Company, Akron, O. Mots tires.

*247_ National Rubber Company, St

Louis, Mo. *426.... New Jersey Car Spring & Rub-

ber Company, Jersey City, N. J. Caprinco tires and tubes. 147-Pennsylvania Rubber Company

Jeannette, Penn, Pennsylvania

Prince Tire Company, New York. N. Y.

Republic Rubber Company, Youngstown, O. Republic Grea and tubes.

Russian Tire Company, New York, N. Y.

Shawmut Tire Company, Boston, Mass. Shawmut tires and tubes. Standard Tira & Rubber Com-

Strin Double Cushion Tire Com-

pany, Akron, O. Swinehart tires and tubes.

124-I'nlied States Tire Company, New York, N. Y. Hartford, Con-tinental, G. & J. and Morgan & Wright tires and tubes,

Tire Protectors.

*317-Double Pabric Tire Company, Au-

hurn, Ind Interlock inner tires, ete 231-

Leather Tire Goods Company, Ningara Falls, N. Y. Woodworth treads, tire siceves, etc. °527—

Standard Tire Protector Company, Indianapolis, Ind. Standard tire protectors.

Voorhees Rubber Manufacturing Company, Jersey City, N. Tubes and repairing material.

Terraminators, Etc.

Brown-Lipe Gear Company, Syra-cuse, N. Y. Gears, transmissions, axles, etc.

Covert Motor Vehicle Company, Lockport, N. Y. Covert transmissions.

Lefever Arms Company, Syrn-cuse, N. Y. Lefever transmissions, jackshafts, etc.

Merchant & Evans Company, Philadelphia, Penn. Transmis-sions, jackshafts, clutches, etc.

1 Truck McCue Company, Buffalo, N. Y. Axles, transmissions, etc.

Muncie tiear Works, Muncle, Ind. Transmissions, jackshafts, brake drums, differentials, 176-

Warner Gear Company, Muncle, Ind. Transmissions, differentials, steering gears

Watner Manufacturing Company, Toledo, O Transmissions, differ-entials, steering gears.

117-

datd Welding Company, Cleveland, O. Wheel rims.

United Kim Company, Akron, O. Wheel clear

Windshields.

Auto Wind Shield Company, Cambridge, Mass. *510-

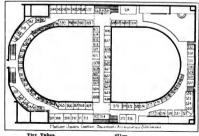
Cox Brass Manufacturing Com-pany, Albany, N. V. Char vision windshields

Eagle Company Newark, N. J. Eagle windshields.

Garage Equipment Company, Milwaukee, Wis. Ge shields, bumpets, etc. Gemes wind-

Emil Grossman Company, New York, N. Y. Swivelaction wind-shields.

*hiteids,
*575_
Ideal Wind Shield Company. New
York, N. Y. Ideal windshields.



Tire Tubes.

Scamless Rubber Company, New Haven, Con-Conn. Seamless (Kant-

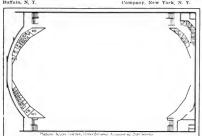
Metal Stamping Company Long Island City, N 135-

C. A Mezger, Inc. New York, N.

Y. Mesger windshields.

Poison Manufacturing Company. Buffaio, N. Y.

bile trunks and luggage carriers. *526-J. Alexander Manufac Company, New York, N. Y. Manufacturing



*301-Sprague Umbrella Company, Norwalk, O. Sprague windshields,

Troy Carriage Sun Shade Com-pany, Troy, O. Troy windshields.

Union Auto Specialties Company, Brookville, Penn. Union auto-Brookville, Penn. matic windshields.

Vanguard Manufacturing Com-pany, Joilet, iil. Vanguard wind-shields.

Wood and Metal Products,

Hess Spring & Axle Company, Carthage, O. Springs, axles.

Phineas Jones & Co., Newark, Wood wheels.

*276 Manufacturers Foundry Company, Waterbury, Conn. Iron

National Tube Company, Pitts-burg, Penn. Shelby scamicss

burg. Penn steel tubes. 149....

A. O. Smith Company, Milwau-kee, Wis. Pressed steel frames, parts, etc.

Spicer Manufacturing Company. Plainfield, N. J. Universal joints

Miscellaneous Camponents.

Buda Company, Harvey, Ill. Motors. INT_

William Cramp & Sons Ship & Engine Building Company, Philadelphia, Penn. Bronze and bearing metala

C. Cowles & Co., New Haven, Conn. Automobile fittings and 133-

Light Manufacturing & Foundry Company, Pottstown, Penn. Aluminum castings

Royal Equipment Company. Bridgeport. brakes, Haybestos brake lining.

Sparks - Withington Jackson, Mich. Pressed metal parts.

Miscellancous.

Alax Trunk & Samule Case Company, New York, N. Y. Automo*314-Allen Automobile Specialty Com-pany, New York, N. Y. Fabric specialties, pressure gauges, etc.

American Taximeter Company, New York, N. Y.

551-Jumes R Ashley, New York, N Y. 0.72M S Auburn Auto Pump Company. Beston, Mass. Automobile tire

pumps. 422_ Auto Specialty Company, Teledo,

Ohlo, 555_____ C. R. Barker & Co., Ltd., New

York, N. Y Brown Company, Syracuse, N. Y. Pumps, pressure gauges, etc.

*607-Calmon Asbestos & I Works, New York, N. Y.

tubes, packing, brake lining, etc. F. 8 Carr Company, Boston, Mass. Top and sllp cover fab-

Chicago Telephone Supply Com-

*563-C. M. B. Company, Syracuse, N. Y. Automobile wrenches.

155-Coes Wrench Company, Worcester, Mass. Coes wrenches,

C. J. Cross & Co., New York, N. *572

Frank H. Cross Company, New York, N Y. Lamps, robe rails,

*571_ t'ulver, Stearns Manufacturing Company, Worcester, Muss. Elec-tric lamp lighting equipments,

Smalley Daniels, Boston, Mass. Automobile specialties

Detroit Lubricator Company, Detrolt, Mich. Detrolt mechanical

Donnelly Motor Equipment Company, New York, N. *310-

Doehler Die Casting Company, Brooklyn, N. V. Die cast parts.

Dover Stamping & Manufacturlng Company, t'ambridge, Mass, Stamped sheet metal specialties * 6004

John L. G. Dykes Company, Chicago, III. Tire specialties *304---

Esterline Company, Lafayette, Lighting system

J. Envenson & Sons, Inc., Cam-

*576... H. A. Elliott, Detroit, Mich Imported metal forgings 159-

English & Mersick New Haven, Conn. A Company. New Haven, Conn Automobile hardware and metal specialties

*315-Essex Rubber Company, Inc. Trenton, N. J.

*417— E. Z. Way Motor Grease Com-pany, New York, N. Y.

L. V. Fletcher & Co. New York.

*55P-II. II. Franklin Manufacturing Company, Syracuse, N. Y. Die cast metal specialties

*329-Gardner Engine Starter Company, Chicago, Ill.



*805___ Clucker & Hixon Company, New York, N. Y.

*273-Gilbert Manufacturing Company. Haven, Conn. Fabric auto mobile accessories

January, 1912.

M. S. Glimer, New York, N. Y.

*524_ Gray Specialty Company, Newark, N. J.

flawthorne Manufacturing Company, Bridgeport, Conn. Fourcylinder automobile tire pumps.

*262Hodgman Rubber Company, New York, N. Y.

R. M. Hollingshead Company, Camden, N. J. Soaps and metal polish

ffomo Company of America, Philmielphia, Penn. Gasoline fuel economizer,

11 J Houpert, New York, N. Y.

Ignition Starter Commany, Detruit, Mich. Disco motor car

*513— International Metal Pollsh Company, Indianapolls, Ind. Somps and metal pollsh.

*291-Kellogg Manufacturing Company, Rochester, N. V. Four-cylinder air pumps.

William R Laidlaw, Jr., New York, N. Y. Cloth and carpet trimmings.

F. T. McGinnis, New York, N. Y.

Mead Engine t'ompany, Dayton, O.

Charles E. Miller, New York, N. Y. Parts, accessories and supplies.

Modern Auto Appliance Company, Chatham, N. Y. "Little Steersman."

Morrison-Ricker Company, Grinnell, in. "Itist-fit" motoring gioves

Frank Mossberg, Attlebu Mass Mossberg wrenches.

*617-Meter Car Equipment Company, New York, N. Y. Moter car accessuries.

*#IG. J. Mutty Company, Boston. Mass. Top and slip cover fabrics.

Mutual Auto Accessories Company, New York, N. Y.

Narraganseti Chemical Company, Providence, R. 1 Storage batteries, lubricants, oils, polisies

*4t5-tleorge Nash Company, New York, N. Y.

Nathan Novelty Manufacturing tompany, New York, N. Y. Fabric automobile accessories.

New Miller Manufacturing Company, Los Augeles, Cal.

New York Sporting Goods Company, New York, N. Y. Antomobile accessories and speciaties.

New Vork V-Ray Sales Com-

THE MOTOR TRUCK

pany, Syracuse, N. Y.

Noera Manufacturing Company, Waterbury, Conn. Noera pumps.

Vaterbury, Conn. Noera pumps.

*514—

A. S. Noonan Tool & Machine
Works, Rome, N. Y. Noonan auiomobile tools and specialties.

Northway Meter & Manufacturing Company, Detroit, Mich. Northway gasoline motors.

Oliver Manufacturing Company, Chicago, fil. Jacks.

Chicago, 1tl. Jacks.

221Pantasute Campany, New York.

N. Y. Pantasoto fabrics.

446...
Paragon Auto Paris Manufacturing Company, New York, N. Y.

ing Company, New York, N. Y.

*403...

Perfect Window Regulator Com-

pany, New York, N. Y.

542—
Perfection Spring Company,

Cleveland, O. Vacandium and Krupp steel springs.

G. Piel Company, New York, N. Y. Automobile horns,

P. Rellly & Son Corporation.

York, N. Y.

John T. Sinnley, New York, N. Y. South and notiches

Start-Life Company, Chicago, 111, Gas lighting system.

Stevens & Co., New York, N. Y. Copper tube connections.

Andrew C. Thompson Auto Company, Plainfield, N. J.

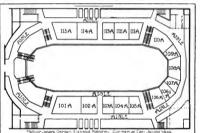
C O Tingley, Rahway, N. J Tire repair speciatites.

Joseph Tracey, New York, N. Y. Dynamometers,

*Sti-Charles H. Tucker Company, New York, N. Y.

Tucker Tool & Machine Company, New York, N. Y.

*532___ U. S. Auto Horn Company, New York, N. Y. *272_



Newark, N. J. Leather products.

titley-Klots Manufacturing Company, Newark, N. J. Automobile and motorcycle horns.

flose Maoufacturing Company, Philadelphia, Penn. Light and number brackets.

*264 C. A. Shafer, Waupuo, Wis Portable vulcanizers.

Simonis Manufacturing Company, Fitchburg Mass Saws and steel clutch discs

Smith Gasaline Meter Company, New York, N. Y. Gasoline me-

*428.... Brant E. Smith, Poughkeepsle,

N. Y.

54... Senora Motor Horn Company, New York, N. Y.

*312-F. W. Spacke Machine Company, Imflampatis, Ind. Automobile parts, hearings, air compressors

Sphinx Motor Company, New

Vaientine & Co., New York, N. Y. Automobile varnishes,

Van Auken Indicator Company, New York, N. Y. *857-

Vaum's Castorine Company, flome, N. Y.

Warburg film Company, Detroit, Mich.

Wasson Piston Ring Company, Laryonne, N. J.

*628...
C. A. Willey Company, Long 1stand City, N. Y. Paints and only.

Orlando W Voung Newark, N. J. Tire repair outlits, rough, polishes, etc.

*Will exhibit first week or ix Float week, Part I, the Peasure Car Show

**Will exhibit second week only Second week, Part II, the Power Wagon Show

Motoreycies-First Week.

712 Eclipse Manufacturing Company. Eimira, N. Y

Emblem. Emblem Manufacturing Company, Angola, N. Y.

707-Excelsior, Excelsior Supply Company, Chicago, Ill.

717-Planders. Flanders Manufacturing Company, Pontlac, Mich.

Harley-Davidson, Harley-Davidson Motor Company, Milwaukee, W.la.

Henderson, Henderson Motorcy-cle Company, Detroit, Mich.

Indian, Hendee Manufacturing Company, Springfield, Mass. 715_ Merkel, Miami Cycle & Manufac-

turing Company, Middletown, O. 703-Minneapolis, Minneapolis Motor

Company, Minneapolls, Minn. 718-M-M, American Motor Company.

Brockton, Mass. 714— New Era, New Era Auto Cycle Company, Dayton, O.

705-Pierce, Pierce Cycle Company, Buffalo, N.

710-Pope, Pope Manufacturing Company, Hartford, Conn.

*10-R.S. Reading Standard Company, Itending, Penn

Thor, Aurora Automatic Machinery Company, Aurora, III 704-

Yale, Consolidated Manufactur-Ing Company, Toledo, O.

CLASSIFIED LIST OF EXHIBITORS AT GRAND CENTRAL PALACE SHOW.

COMMERCIAL WASONS.

- SF 13-Argo, Argo Electric Vehicle Company, Saginaw, Mich. E2-
- Atterbury, Atterbury Motor Car Company, Buffale, N. Y.
- Bowling Green Motor Car Com-pany, Bowling Green, O. SF A3-
- Chase Chase Motor Truck Com-
- MF M2_ Keily, Kelly Motor Truck Company, Springfield, O. SF 1.2
- Lauth-Inergens, Lauth-Juergens Motor Car Company, Fremont, O. SF 43-
- Lippard-Stewart, Lippard-Stew-art Motor t'ar t'ompany, Buffalo, N. Y. SP J4---
- Maxim, G. II, Bushnell Press

M5 M4 MZ MI JΖ 02 OI G к мн LZ Œ F2 F١ £δ D ES £1 C1 - 02 45 44 43 A2 Grand Central Palace Main Floor - Pleasure and C pany, Syracuse, N. Y. Company, Thompsonville, Conn.

- G-Commer, Wyckoff, Church & Par-tridge, New York, N. Y.
- D2-Correja, Vandawater & Co., Eliza-beth, N. J.
- Cortland, Cortland Motor Wagon Company, Pitisfield, Mass.
- SF MI-Dart Manufacturing Company. Waterloo, Ia.
- SP 1.1-Dayton, Dayton Auto Truck Company. Dayton, O.
- K4-Decatur, Decatur Motor Car Company, Decatur, Ind. K1-
- Durant-Dort, Durant-Dort Carringe Company, Plint, Mich.
- Eclipse, Eclipse Truck Company, Franklin, Penn. H5-
- Pederal. Federal Motor Truck Company, Detroit, Mich.
- MF MI-Gramm, Gramm Motor Truck Company, Lima, O.

- - Motor Wagon. Motor Wagon, Motor 'empany, Detroit, Mich. Wagon WW 102 Newark, Newark Auto Manufac-
 - turing Company, Newark, N. J. SF J3..... New York, Atlantic Motor Truck Company, New York, N. Y.
 - Packers, Packers Motor Truck Company, Wheeling, W. Va.
 - Ca Progress Development Company, New York, N. Y.
 - SF B3-Sanbert, Sanford-Herbert Com-
 - pany, Syracuse, N. 40 101 Sanford, L. E. Schlatterback Man
 - ufacturing Co., East Orange, N. J. Schacht, Schacht Motor Car Com-pany, Cincinnati, O.
 - SF F2-Smith, A. O. Smith Company, Milwaukee, Wis.
 - SP HI-Standard, Standard Electric Car Company, Jackson, Mich.

- SF JI-Suilivan, Suilivan Motor Car Company, Rochester, N. Y.
- SF 112-Stuyvesant Motor Car Company, Cleveland, O.
- 44-Universal, Universal Motor Truck t'ompany, Detroit, Mich.
- SF D3-Veerac Veerac Sales Company, SP CI-Velle, Velle Motor Vehicle Com-
- pany, Moline, Ill. Waiker, Waiker Vehicle Com-
- pany, Chicago, Ili. Walter Walter Motor Truck Manufacturing Co., New York

PLEASURE CARS.

- MF K-Abbott-Detroit Abbett Motor Company, Detroit, Mich. MF MA.
- Auburn, Auburn Automobile Company, Auburn, Ind. SF A4_ Bergdoll, L. J. Bergdoll Motor
- Company, Philadelphia, Penn.
- MF LI-Cino, Haberer & Co., Cincinnati, O. MF FI-Cole, Cole Motor Car Company, Indianapolis, Ind.
- MF 12-Cutting, Clarke-Carter Automo-bite Company, Jackson, Mich.
- MF 95-De Tamble, De Tamble Motors Company, Anderson, Ind.
- MF D—
 Fiat, Flat Automobile Company,
 New York, N. Y. MP J2-
- Firester e - Columbus Ruggy Company, Columbus, O. WF 02
- Gient Western, Great Western Automobile Company, Peru, Ind. 116-
- Herreshoff. Herreshoff Company, Detroit, Mich. ME PO
- Hupmobile, Hupp Motor Car Com-pany, Detroit, Mich. MF 13
- Imperial, Imperial Au Company, Jackson, Mich.
- A7-King, King Motor Car Company, Detroit, Mich. MF JI-
- Kline Kar, Kline Motor Car Com-pany, York, Penn.
- K-R-1-T. C-R-I-T, K-R-I-T Mo company, Detroit, Mich. Motor Car MF N2-
 - Motor Car Company, Adrian, Mich. D1-
 - Marathon, Marathon Motor

Works, Nashville, Tenn. MF Et-Marion Motor Sales Com-

Wheeler & Schebler, Indianapolis, Ind. Schebler carburetors



Mr. ot-

McFarlan, McFarlan Motor Car Company, Conneraville, Ind. SE. Metz. Metz Company, Waltham

Mann MF NI-

Middleby, Middleby Automobile ('ompany, Heading, Penn, MF 44-

mpany, Toledo, O. MP 17-

it iterson, W. A. Paterson Com-

12-Paige-Petroit, Paige-Detroit Motor Car Company, Detroit, Mich.

MF 1.2-Penn, Penn Motor Car Company, Pittsburg, Penn,

MF II—
Itambler, Thomas B. Jeffery Company, Kenosha, Wis,

MP fine Begal, Regal Motor Car Company, Detroit, Mich.

MF E2... Stutz ideal Motor Car Company, Indianapolls, Ind.

MF 45-6---Velle, Velle Motor Vehicle Com-

MF F3-Warren-Detrolt, Warren Motor Car Company, Detrolt, Mich,

SF 45-Westentt Motor Car Company, Richmond, Ind.

MF, Main Floor SF, Second Floor.

ACTESSORIES CLASSIFIED, Ball Bearings

R. I. V. Company, New York, N. Y. R. L. V. ball bearings.

S. K. F. Ball Bearings Company, New York, N. Y. S. K. F. ball bearings.

Carbureton

Breeze Carburetor Company, Newark, N. J. Breeze carburetors.

Stromberg Mojor Devices Company, Chicago, Ill. Stromberg carburetors.

Demountable Rims. Booth Demountable Rim Commountable rima.

M4-Dorian Demountable Rim Com-pany, New York, N. Y. Dorian demountable rims.

Princip ...

Dean Electric Company, Elyria, O. Electric horns.

D2-General Electric Company, Sche-nectady, N. Y. Magnetos, electri-cal specialties,

Gray & Davis, Amesbury, Mass. Lamps, lighting systems.

Hartford Suspension Company Jersey City, N. J. Shock absorbRemy Electric Company, Anderspecialties.

Gasoline Storage 42-

8 F. Bowser & Co., Inc., Fort Wayne, Ind. Gasoline storage systems, tanks, etc.

Wayne Oil Tank & Pump Com-pany, Fort Wayne, Ind. Gaso-line storage systems, tanks, etc.

Parts and Components.

Gemmer Manufacturing Company. Detroit, Mich. Steering gears, etc.

McCue Company, Buffalo, N. Y. McCue rear axles

Muncie Gear Works, Muncie, Ind. Transmissions, steering gears, etc B12-

Peck Wheel Company, Chicago, 110

itoss Gear & Tool Company, La-fayette, Ind. Transmissions, steering gears, etc.

Timken-Detroit Axle Company, Detroit, Mich. Timken-Detroit Detroit, h

United Rim Company, Akron, O. Wheel rims

Publications.

Automobile Journal Publishing Company, Pawtucket, R. I.

E7-Chilton Company, Philadelphia,

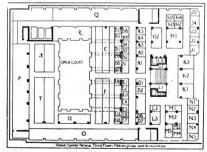
F'2_ Class Journal Publishing Company. New York, N. Y

Class Journal Publishing Com-8113....

Horseless Age Company, New York, N. Y.

Motor Vehicle Publishing Com-pany, New York, N Y.

New Publication Company, New



Lavigne Manufacturing Company, Detroit, Mich. Tank gauges, Iubricators, vaporizers.

York, N. Y. 112__

Power Wagon Publishing Company, t'hleago, Ill.

Speedometers

Standard Thermometer Company, Boston, Mass. Standard speedometers.

Wil— Veeder Manufacturing Company, Hartford, Cont. Veeder recording instruments.

Warner Instrument Company, Beloit, Wis. Warner auto-meters.

Storage Batterles.

Edison Storage Stattery Company, West Orange, N. J. Edison storage batteries.

N1-National Carbon Company, Cleveiand, O. Columbia dry cells.

Tirrs, Tubes and Rims.

Diamond Rubber Company, Akron, O. Diamond tires and tubes.

Empire Tire Company, Trenton, N. J. Empire lires and tubes. 1.3-... Firestone Tire & Rubber Company, Akron, O. Firestone (ires, tubes and rims.

...

Fisk Rubber Company, Chicopee Falls, Mass, Fisk tires, tubes, etc. K3— B. F. Goodrich Company, Akron.

O. Goodrich lires and tubes.

Goodyear Tire & Rubber Com-

Goodyear Tire & Rubber Company, Akron, O. Goodyear tires, tubes and rims.

Motz Clincher Tire & Rubber Company, Akron, O Motz lires and rims

Pennsylvania Rubber Company, Jeannotte, Penn. Pennsylvania lires and tubes,

1 ires and tubes,

Swinehart Tire & Rubber Company, Akron, O. Swinehart tires and tubes.

HiUnited States Tire Company, New York, N. Y. Hartford, G & J. Morgan & Wright and Conti-

Morgan & Wright and Continental tires and tubes.

Automatic Motor & Engineering Company, Chicago, Ill.

F11-

Caiman Asbestos & Rubber Works of America, New York, N. Y. Motobestos brake lining, packing addresses

packing, etc.

H5

Adam Cook's Sons, New York, N.

Y. Albany greases.

D1—

Wm. Cramp & Sons Ship & Ensiline Building Company, Philadelphia, Fonn. Bearing metats, metals, etc.

Grip Nut Company, Chicago, ill.

Chas. E. Miller, New York N. Y. Accessories, supplies, parts etc.

Modern Auto Appliance Company, Chatham, N. Y. "Little Steersman."

pany, Chatham, N. Y. "Little Steersman." E13— National Pump Company, i-ay-

ton, O.

107.

Oliver Manufacturing Company, Chicago, Ill. Jacks.

EXHIBITORS AT BUFFALO'S FIRST DISPLAY.

THE dealers in Buffalo, N. Y., are to have two shows this year, one of which opened in the 74th Regiment armory, Dec. 30, and will continue until Jan. 6. The second, which was thought to be necessary, because this building, though even larger than ever before, was unable to accommodate all who desired to make display, will be beld Feb. 5-12. The exhibitors at the first show follow:

Commercial vehicles-Henry Brunn Automobile Co., Peerless; Empire State General Vehicle Company, General Vehicle; George Ostendorf, Franklin; A. W. Meyer Motor Car Company, Knox and Reo; United Motor Buffalo Company, Sampson; Mason B. Hatch, Stearns; Pierce-Arrow Motor Car Company, Pierce-Arrow; Dixon Motor Car Company, Velie: Sanderson & Burghardt Company, Speedwell: Co-Operative Motor Car Company, Pope-Hartford and Mack; Bulck Motor Company, Bulck; Lutz Automobile Company, White; Louis Engel, Jr., Cartercar; Densmore Company, Packard; Studebaker Corporation, Studebaker; Werick Bros. Motor Car Company, McIntyre and Schacht; Barret Motor Car Company, Keily; Overland-Buffalo Company, Overland and Garford; Buffalo Kissel Kar Company, Kissel Kar: Anderson Electric Car Company, Detroit electric; Hays-Schoeplin Company, Rapid and Reliance; Lippard-Stewart Motor Car Company, Lippard-Stewart,

Pleasure cars-J. I. Case Threshing Machine Company, Case; Henry Brunn Automobile Co., Peerless; John J. Gibson Company, Mitcheil; George Ostendorf, Franklin; Ralph E. Brown Motor Car Company, American, Babcock and Winton; A. W. Meyer Motor Car Company, Knox, Reo and Pullman; United Motor Buffalo Company, Columbia, Maxwell; J. A. Cramer, Stoddard-Dayton; Mason B. Hatch, Chalmers, Hupmobile and Stearns; Pierce-Arrow Motor Car Company, Pierce-Arrow; E. R. Thomas Motor Car Company, Thomas: Dixon Motor Car Company, Herresboff and Velie; Sanderson & Burghardt Company, Firestone-Columbus, Havers and Speedwell; Co-Operative Motor Car Company. Abbott-Detroit, Pope-Hartford and Stevens-Duryea; Poppenberg Motor Car Company, Paige-Detroit, Warren and Everlit: Albert Poppenberg, Apperson, Clark and Westcott; Bulck Motor Company, Buick; Lutz Automobile Company, White and Premier; Louis Engel, Jr., Cartercar; Babcock Electric Company, Babcock: Matheson Automobile Sales Company, De Tamble and Union; K-R-I-T Motor Car Company, K-R-I-T; Windsor Motor Car Company, Elmore and Kline-Kar: Densmore Company, Packard; t'entaur Motor Company, Oakland; Studebaker Corporation, E-M-F and Flanders; Frontier Motor Car Company, McFarlan; Werlck Bros. Motor Car Company, Haynes, McIntyre and Schacht; Zimmer Motor Vehicle Company, National; Fiat Sales Company, Plat; Edgar Messersmith, Lexington and Whiting; Barret Motor Car Company, Hudson; Baker Bros. Motor Car Company, Cole and Nyberg; Olds Motor Works, Oldsmobile; Delaware Ave, Garage, Marmon; Hupp Corporation, R. C. H. and Hupp-Teats; F. A. Ballou, Bursh, Jackson and Selden; Overland-Buffalo Company, Overland and Garford; Buffalo Kissel Kar Company, Kissel Kar and Simplex.

Accessories—Standard Oll Company, Polarine oils; Brunn & Co., tous and bodies; Polson Manudacturing Company, windshields; Jayace Automobile Supply Company, general line; Frey Automobile Supply Company, De Laze overhead washers; Iroquois Rubber Company, G. & J. tires; Frontier Rubber Company, Frontier tires; Coas E. Miller, full line; Nigara Lead & Battery Company, Salom batteries.

DENVER SHOW EXHIBITORS.

While the Denver automobile show is still some distance away, being scheduled for March 4-10, not a little interest has been awakened in the commercial vehicles which will be displayed. Practically every agency in the city will be represented, and it is anticipated that a number from other sections of the Southwest will secure space if possible. Among those who will show business vehicles are the following:

W. W. Barnett, Alco; Overland Automobile Company, Brush, Kissel-Kar, Overland, Selit; MacFarland Automobile Company, Bulek, Packard; Timpte Bros. Wason Company, Chase; Continental Motor Truck Comjany, Continental Motor Sales Company, Grabowsky; Mathewson Automobile Company, Reo; Permaid, White; Krebs-Gotshall Automobile Company, Dertoil electric; Carstarphen Electric Company, General Vehicle electric; Felker Automobile Company, Waverley electric.

WILL SELL PEERLESS TRUCKS.

it. 8, de Mitkiewicz, formerly sales engineer with the Motor Engineering & Sales company of New York City, has resigned to accept a position with the track department of the Peerless Motor Company of New York, at 1:56 Broadway and 5:th street. His headquarters will be at that andress, but he will occupy his time in placing Peerless trucks, made by the Peerless Motor Car Company, Cleveland, O., in the East.

TREND OF DESIGN IN COMMERCIAL CARS.

Rapid Progress Noted in Development of Practical Power Wagon--Simplicity and Accessibility Features of New Models Ranging from Light Delivery to Heavy Truck.

BELIEVING that there is a demand for a commercial while of 1000 to 1500 pounds carrying capacity, the Sullivan Motor Car Company, Rochester, N. Y., is manufacturing and marketing a chassis to which is fitted several types of bodies, three-being designed principally for delivery work. The same chassis is utilized for all models, its sturyl consuraction permitting of this arrangement, and being well powered is capable of taking care of reasonable overload.

The motor is located in front and the arrangement of the power blant is very compact as well as easily accressible, the being reached by the lifting of the usual bonner. It is a two-splinter, four-sycle, water-cooled unit, with a 4.5-inch bore and stroke and rated at 18 horse-power, being of the horizontal dubble-opposed type, and the cylinders are cash singly with liberal water Jackes, these being cast linegral singly with liberal water Jackes, these being cast linegral fully, as are the pistons and rings, insuring good compression.

The connecting red, nath and cambuilt hertims, are of ample dimensions, these being reached early by the re-moval of the top section of the erankense on which is fitted the magnetic. The crankense in 18.75 inches with hearings 3.8125 inches. The connecting red bearings are 1.75 inches. A Schelber carburder is fitted, this being located on the right hand side of the motor, well protected from durt and possible higher, and the intake pines bending to the cylin dera are well designed and free from sharp bends, thus facilitating the passage of the mature.

The five-feed mechanically operated offer is carried on an extension of the upper cranicase on the left hand side of the motor and is positive in its action. Cooling is lot the thermo-synhon system, the water place being of illeral size. The radiator is located in front and cooling is added by blades in the flywheel of the engine. Ignition is by a floss high-fresion magneto.

An improved planetary transmission is fitted and energy is transmitted to the driving shaft by another shaft carrying a dust and oil-tight universal joint. Brown-Lipe gears are utilized in the differential, and Hyatt roller bearines and ball thrusts in driving shaft. Final drive is by side chain and the strockets are adjustable and detechable, internal expanding, 10 by 2.5-inch brakes, are fitted to the rear wheels and are positive in action, this being brought

about by an equalizer. These members are easily reached and adjusted.

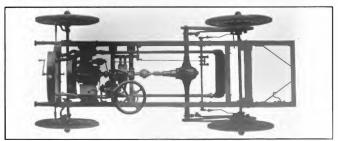
The frame is of liberal dimensions and all sections including cross members are hot riveted. Steering is by the



Power Place, Showing Compact Arrangement of Components

usual wheel and the control of gas is by lever mounted thereon. The driver's position is all the left with control. Countrol. The front sale is 1.375 inches and rear 1.75. Full elliptic springs are employed both front and cear, Fullow of the former being half-secoll and the latter full. Solid three are fitted, 36 by 2.5 inches.

The design of the frame is such that a long overhanc body may be fitted as will be noted in the accompanying illustration. This section of the frame is strongly reinforced by two large cross members. This arrangement permits of the fitting of a body of the express type and that made by the conquay is 72 linches long and 42 linches wide. A full wood panel body is also fitted to the same chassis and is made of ash frame work and heavy silks with hevel plate is made of ash regions with the property of the contraction of the



thusis of Sallians for Wilch is Pitted with Unctanted Dunlie Opposed Notor Located in Prost and Ensils Accessibile

SPEEDWELL PRODUCT INCLUDES LARGER TRUCKS.

SPEEDWELL, commercial vehicles, manufactured by the Speedwell Motor Car Company, Dayton, O., maker of the well known pleasure cars of that name, include in addition to ambulances, patrols and other automobiles designed

represents the maximum at which the vehicle should be run, 12 miles an hour. The cylinders are cast in pairs with integral water lackets, and are of the Livne.

A Schebier, water jacketed carburetor is incorporated,



Four-Ton Speedwell Fitted with Standard Sideboard Body, Including Folding Top, Storm Front and Curtains,

for municipal service, two machines of four and six tons capacity, respectively. These are said to include features not found on any other make of power waron, although in the main they follow standard lines of construction. The four-lengths of wheelbase, 115 and 138 inches, and although a wide variety of bodies is fitted, special types may be procured from the company.

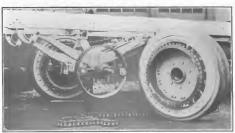
The motor is located in front, under the floorboards of the driver's seat, and is easily accessible for minor adjoint ments by removable panels. The framework of the seat is shinged and by removing boths may be raised at either slaked at either slaked at either slake at commendable arrangement, and one that uncovers the earter driving mechanism.

The chassis has a four-cylinder, four-cycle, water-cooled motor with a five-inch bore and stroke and is rated by the maker at 40 horsepower at 1000 revolutions a minute, which the feed being gravity from a 19-galion tank over the radiator, ignition is by a high-tenion Exementa magnetor with automatic spark advance. As the motor will start by creaking with this member, no battery system is ditted. Labrication is by the splash system, a gear driven pump foreing the oil through a sight feed on dash to the crankcase where a constant level is maintained. A cellular radiator, suspended on double ord partners, is provided and the water is circulated by a centrifugal pump and cooling assisted by a belt driven fan.

The clutch is cone, leather faced. A selective type of transmission, affording three species forward and a reverse, is controlled by a single lever located in the centre of the footboard and at the right of the operator. Drive is by shaft to jackshaft, in which the differential is housed, and by sprockets and side chains of ample dimensions to the rear wheels. A differential device is fitted for the purpose of se-

curing traction by both wheels, this being brought about by locking. This is operated by a lever which extends through the sides of the main frame.

Semi-elliptic springs are fitted both front and rear, the former being 40 by three inches, and the latter 48 by three. An auxiliary member is hung from a cross member on the frame and bearing upon plates mounted on the rear axle comes into operation only when the truck is loaded nearly to its full capacity. front axie is of the solid I beam section type, ample in size as is the rear member. The front and rear wheels are mounted with Timken roller bearings and both these members are 36 inches fitted with five-inch solid tires, single in front and dual at the rear. Two sets of brakes are provided.



Showing Construction of Rent Wheel Brakes, Springs, and Auxiliary Spring Member-

SAURER TRUCK PRESENTS STURDY CONSTRUCTION.

SAURER trucks, the classis of the 4.5 and 6.5-ton sizes of which are shown herewith, are manufactured under Rieeme in this country by the Saurer Motor Coupany, Plainfield, N. J., a constituent of the International Motor Company, New York City. The Swiss product enjoys an enviable reputation, having won 5.2 first prizes in European contests, and the recently completed Ovean-to-Ocean trip of 5200 miles in America, which was finished without a mechanical or structural defect being brought out, gives some files of the earls reliability.

Three special, parented mechanical features, each desirable, mark his design. They are: The Economy rathuretor, the air brake and the self-stater. The first named has two nozzies, the operation of which is controlled by an autumatic clock valve. One jet is constantly in use, the second being brought into play when the speed of the motor reaches a certain point. The self-statter is on the commerced air principle.

The motors fitted to the 4.5 and 6.5-ton trucks are four-cyllider, four-cycle, water-cooled, with cyllinders cast in pairs. The valves are on the opposite sides, or nickel steel and of liberal dimensions. The motor is rated at 3.7 horse-power at 1000 revolutions, having a 4.375-inch bore and 5.75-inch stroke. Crank, cam and fansisting are mounted on imported ball bearings, or large diameter, and all are of the fleast theomem-level seed. In machining and arect balance, both running and static, this resulting in a quiet, powerfull motor.

Lubrication is of the forced feed type with gear inside the oil tank and driven from the governor shaft by spiral gears. Cooling is by water, actuated by a centrifugal pump, easily accessible. Ignition is a high-tension magneto with spark advance lever on the dash, and is advanced or retarded by means of a sleeve on the driving shaft. The motor is controlled through a governor of the centrifugal ball type, this being restricted by a spiral spring. A cone clutch is used, leather faced with a rubber ring below it. The spring pressure is such as to give easy engagement and release. A four-speed transmission is utilized, the gears of which are of nickel steel and the shafts are mounted on annular ball bearings, with thrusts for lateral stresses. The differential gear, of the four-pinion bevel type, is mounted in the gearcase. The lackshaft is of chrome-nickei ateel mounted on ball and thrust bearings.

Three sets of brakes are provided; the air form, which the driver operates by a short lever on the dash; the usual contracting band on the differential shaft operated by pedal, and the internal expanding in the rear wheels. The axies are of special drop forged steel, of large section.

The wheels, which run on roller bearings, are ample in



thansis of 4.5-Ton Sanrer Truck, Hustrating the Sturdy Construction of Frame and Cross Members and Low Centre of Gravity.

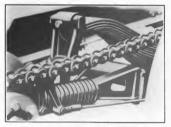
size, and are fitted with solid tires, single in front and dol in the rear. These of the 4.5-on are equipped with 36 by five inches front and 42 by five inches rear. The rear wheels of large chassis have 5.5-inch irries. The weight of the smaller chassis is 5700 pounds while that of the larger model is 6800. The wheelby share are 5.5-3 and 1.50 inches



Depicting Special Inside Hear Spring Construction and Straight. Line Drive on 6.5-Ton Wodel,

VELIE LINE CONSISTS OF THREE MODELS.

VELIE commercial vehicles, made by the Velie Motor Vehicle Company, Moline, Ill., consist of three models, 1500-pound, 1.5 and three-ton, respectively. Every working part is easily accessible, facilitating inspection. The



Showing Velle Spring Strut Hod and dustife Spring Suspension, design is such that the weight of the load is evenly distributed permitting of lighter spring suspension at the front axle thus protecting the power plant from road shocks and vibration. Among other features are: A heavier frame, larger wheels and three, spring strut rods, differential lock, larger rear axle, and means for driving a logaling wheel.

The chassis is a complete unit in itself to which may be attached any standard, optional or signal body, and is made in two lengths of wheelhase, of 142 or 178 inches in the three-ton size, permitting of carrying receptacles suitable for any requirements. The chassis may be turned in a 56-foot circle. The weight of the longer member is a 56-foot circle. The weight of the longer member is receible stake body, such as shown in the accompanying illustration, weight 1000 pounds.

The motor, which is focated in front, is a four-cylinder, four-cycle, water-cooled type with a 4.5-inch phore and 5.25-inch stroke. The cylinders are cast in pairs with integral water jackets. The water is circulated by a large centrifugal pump on the right, hand side of the engine, and the radiator is suspended upon a spring cushinored saddle to absorb road shocks. Cooling is aided by a belt driven adjustable fan, A splanh system of lubrication is employed.

and a constant level in the crankcase is maintained by a pump. A sight feed is fitted to the dash and the reservoir is of six quarts capacity. Ignition is by a Splittorf magnoto which is independent of the auxiliary, consisting of batteries and the Atwater Kent system. The spark and throttle lovers are mounted on the steering wheel and provide control up to a rate of 12 miles an hour. An automatic governor prevents a greater speed, this member being as sealed in a case to prevent the operator changing its adjustment.

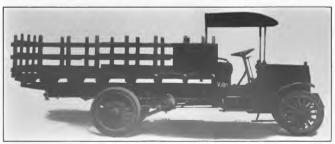
A three-plate disc clutch is utilized and is fitted with an automatic clutch brake. The selective sibling gear transmission, which provides three speeds forward and a transmission, which provides three speeds forward and a reverse, and the extra heavy gears and shafts are made of nickel steel, mounted on Timken bearings and have a 1.5-inch face. The lackshaft and differential also are sturdily constructed and carried in a separate housing from the transmission. The differential gear Is 15 tinches in diameter and the entire assembly is mounted on Timken bearings. A double Spier universal joint drive is employed between the transmission and fackshaft, and the latter is supported by a spring torque arm.

Final drive is by 1.73-lineh extra heavy roller side chains and the adjustable strut rolls are fitted with heavy springs which cushion any shock on the jarkshaft, protecting that member as well as genrs and chains. Provision is made for the fitting of spreakers to drive a loading which.

The front springs are sente-dipple, 40 undes, 2.5 inches wide, while the rear members are of the same type, three inches wide, hung outside the frame to reduce localit and lower centre of gravity. Two sets of brakes are fitted, the service being on Jackshaft, 14 by 2.5 inches, and operated by pedal. The emergency members are 1 by 3.5 inches, and operated and operated by leads the distribution of the period of the perio

The steering gear is a special Velle design, of the worm and sector type, and operated by a 20-met wheed. The fuci capacity is La gallons and the water tank carries 12 gallons. A differential lock is fitted, this member being operated by pedal convenient to driver. This device permits of the locking the rear axis so that both wheels may be driven positively, thus overcoming the slipping of one.

The front wheels are 36 linches in diameter fitted with single solid tires. An unusual construction is that of the spokes of the rear members, these being three linches aquare, of linches in diameter and slow with five-linch dual tires. For this arrangement the company claims a tire assembly not found on any other truck of equal rated capacity, and that the larger wheels and tires mean long life and a capacty of withouthing overloading without description.



Velle Three-Ton Truck Fitted with Standard Stake Bods, the Besign of Which Makes for an Even Distribution of Lond.

LIPPARD-STEWART OFFERS EXCELLENT FEATURES.

L IPPARID-STEWART delivery cars, manufactured by the Lippard-Stewart Motor Car Company, Buffalo, N. Y. are made in one classis size, that of 1500 pounds capacity, and to this is fitted many types of bodies to suit the needs of purchasers. The principal siyles are seven in number, that illustrated herein heing of the open box design which provides a londing space 75 inches long and 45 inches wide.

The chasis embodies many features which are confined to high priced whelies, and throughout the mechanical details are refined to a high degree. Compactness, simplicity and accredibility are the results of careful identified in construction. Many ideas incorporated in leading foreign continueral velicles are included, such as lared spark and and synchronized the properties of the properties of an analysis of the properties of the properties of unusual stretches.

The motor, which is shown in an accomposition (Hustraton), is cast a bloo of special gray prob, and is a four-cyllader, four-cycle, water-cooled unit with a 3.375-fine) horeand 4.312-fine) stroke, rated at 26-22 horspower. The mechanically operated valves are located on the left side and actuated by the constant which is supported by large annular learners. There is length, and is of liberal size, 1.855 inches, and has large sized annular bil locatings.

A Kiuscion automatic carburetor is located on the left hand side of motor, and the arrangement of the Intake pipe is such that carburetion is facilitated. The lubrication system is of the constant level splash type, operated by a gear pump which circulates the fluid through the crank-care and tank integral with it, and the capacity is two galions. Cooling is by the thermo-syphon system, very large water spaces being provided around the cylinder, and the pipes leading from the radiator at the dash are of theraid dimensions, assuring perfect cooling. The usual fan arrangement is disjensed with, as surtion member fitted to the back-tenson Bosch magneto is employed, this arrangement eliminating tite auxiliary ignition system and providing a fixed water, a stratise favored abroad.

The clutch is of the multiple disc type, 12 steel plates against Raybestos being enclosed in a case which is integral with that of the transmission. The latter is of the selective type, providing three speeds forward and a reverse, and the centre control levers are a part of the transmission, eliminating extra parts. The front ante is of the 1 beam section, with spring seats forged in one polect. The rear

axie is a special Timken of the full floating type. Timken roller bearings are used throughout, these being installed in the steering knuckies. The differential is easily accessible by means of a large inspection plate.



The Lippard-Stewart Power Plant, a Compact Design Making for Simplicity-Soir the Arrangement of the Pan Blades on the Flywheet.

Aberal brakes of the contracting and expanding types reflicted to the rear wheels, and are 15 inches in diameter by 2.5 inches wide. These are positive in action and easily adjusted. Pull elliptic springs are emblored in front, long semi-elliptic members at the rear, and an auxiliary coil spring is brought into service when the car is loaded. The frame is of channel section, pressed sizely, tapered in front ogive a short turning radius, and wide at points subject to stresses. The driver's position is at the left with control member at the right. Theremust iters, 24 by four of member at the right. Theremust iters, 24 by four 4.5-inch since is employed on some models. The wheelbase is 115 inches and chassis weight, 2200 pounds.



Lippard-Stewart 1800-Pound Capacity Vehicle, the Chassis of Which Panisins Mechanical Features I shally Limited to High Priced Care-Simplicity and Campaciness Mark This Design.

WHITE EMBRACES A VARIETY OF MODELS.

W HITE commercial vehicles, made by the White Comautomobiles, are manufactured in sizes ranging from the 1500-pound capacity wagon to the truck designed for car-

driven centrifugal pump, and cooling is aided by fanshaped spokes of the flywheel. The radiator is supported carburetor is a White design, water jacketed, and ignition

lubrication system is reliable and efficient, providing as it does oil to all working parts, and the pump is gear driven with a sight feed incorporated on the dash. A device is fitted for relieving the compression when starting the motor. and is operated by a lever on the duch A leather fuced cone clutch is

is by a high-tension magneto. The

utilized, and immediately back of this is suspended the transmission which is of the selective type, providing four speeds forward, with direct drive on the third, and a reverse. All gears are of chromenickel steel, ball bearing shafts. and the gearcase is supported on cross members of the frame by a three point suspension.

The chasis of the Laston truck which is illustrated here, has a shaft drive from the gearcase to the differential, and is fitted with

telescopic. A large place permits of easy acress to the dif-

thussis of the L5-Ton White Teach, Illustrating the Compactness of Power Plant two universal joints, the rear being ferential

Semi-elliptic springs are employed both front and rear, the former being 37 Inches long and the rear 45 and of vanadium steel. Two sets of brakes are fitted. The wheels have unusually heavy hules and spokes, and annular ball bearings are emuloyed. Pneumatic tires are utilized, 36 by four inches, single in front and dual at the rear. The wheelbase is 144 inches and tread 56. The fuel capacity is 18 gallons. The total weight is 3710 nounds. Fitted with

the standard express body, the length inside back of seat

is nine feet two luches, and 52 inches wide. With the

standard stake platform type the length inside back of seat

is nine feet six inches by 64 inches wide,

many of its vehicles are utilized in municipal and government service. Low cost of maintenance, accessibility, and a simple, compact power plant, as well as a high grade of material and workmanship, are the features emphasized. Lower fuel consumption is claimed of the motor which

rying heavy loads. The company is a large producer and

is located in front, because of its long stroke and heating of the intake and cooling of the exhaust gases. It is a fourcylinder, four-cycle, water-cooled unit with cylinders east en bloc and the intake, exhaust and water manifolds cast integrally. The bore is 3.75 inches and stroke 5.125. The mechanically operated and interchangeable valves located on the side of the motor, are of liberal size, and enclosed by a removable plate. The water is circulated by a gear



White 1500-Pound Enpuelly Delivery Wagon, to the Chassis of Which is Fitted a Sumbee of Bodies to Meet Requirements.

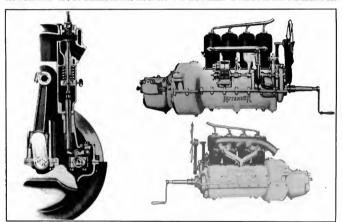
NEW RUTENBER MOTOR DISTINCT IN DESIGN.

D ISTINCTIVE features characterize the new type of mo-Marion, ind., sole manufacturer of the well known Rutenber engine, shown in the accompanying illustration. In designing the unit power plant, which is known as the model X unit, it was necessary to construct a new form of crankcase, one providing for the housing of the flywheel as well as for the attachment of a standard type of transmission. Other features include a new location of the centrifugal water pump and a distinctive design of valve lifting mechanism, the arrangement of which is also depicted.

The motor is similar in every respect to other models produced by this company and is a four-cylinder, four-cycle, water-cooled unit with a 4 125-inch bore and 5 25-inch stroke. The cylinders are of the L head type, cast singly, and of semi-steel. They are machined carefully and ground

The exhaust and intuke pipes are located on the same side and are of very liberal size and clean castings. Pipes are counterbored in each quening as also are the cylinders. and a straight nipple is used in this counterbore. Copper asbestos gaskets are fitted between the cylinders and pipes, and the latter drawn up by tiebars on liberal studs, preventing auxiliary air or gas leaks. The water pipes are tapered brass tubing with cast flanges and are attached to the cylinders by liberal stude and acorn head brass nuts.

The oil pump is located at the front and lowest point of the motor, is entirely enclosed, runs in oil, and is driven by a worm gear from the timer shaft, which also drives pump and magneto shafts. Lubricant is supplied to each of the connecting rod compariments by a tube, and small openings allow it to be delivered to each of the connecting rods and hearings. A constant oil level is maintained and



New Type of Unit Power Plant Brought Out by the Western Motor Company, Marion, Jud., Embodying Distinctive Features, including New Design of Valve Lifter.

side and are operated through very long guides which are cast separately and pressed into the cylinder.

The valve springs are completely enclosed, and have aluminum caps which can be removed readily for inspection or for the adjustment of the valve lifters. Another important feature, a distinctive design, is the valve lifter arrangement which is illustrated in the cross sectional view. This is made up of a forged arm, swivelled from a place and fitted with a hardened roller and bushing which is in the centre of this lever and directly over the camshaft. The latter is offset to the right, and lowered to the centre of the crankshaft. This design riiminates noise, provides a quicker opening of the valves, enables the motor to develop more power and allows accurate adjustment. The long steel guide is free from side slap and the entire arrangement is claimed to give a more sattsfactorily operating motor as the valves seat properly and do not require frequent grinding. This also is said to eliminate carbon troubles.

under heat treatment. The valves are all located on left hand - the overflow opening is large, preventing an oversupply in the crankcase and possible smoking.

The centrifugal water pump is located on the right hand side of the motor and is driven from the timer shaft, operplace. The oil sight feed is placed on this side, enabling the operator to note at a glance the amount of lubricant in the reservoir. Oil may be supplied at any time by the lifting uting the magneto which is located in a very accessible of a suring cover. The inbricant is strained through a wire mesh before it enters the reservoir which has a capacity of two guilons. The fan is located on a swivel bracket and a spring device is fitted for the purpose of maintaining tension. It is driven from an auxiliary shaft, and is removed easily.

The motor is auspended by three points, arms being cast integral with the upper crankerse at the flywheel housing to support it at the rear, while the third point is at the front; a drop forged flange which is utilized as a support for the starting crank.

FIVE MODELS CONSTITUTE COUPLE-GEAR LINE.

COUPLE-GEAR trucks, made by the Couple-Gear Freight-Wheel Company, Grand Rapids, Mich., derive their name from the fact that the wheels used contain the driving means, this comprising a gear palanced against a similar means.

wheels, this arrangement providing greater traction.

in the 3.5 and five-ton models of the battery driven type, the batteries are undersing in the middle of the chasels. These are of 44 cells each, the five-ton having 19



Showing Wheel Diannembled in Huntrale Position of Armsture and Method of Fastening Motor in Piace, Also Driving and Driven Revel Genes,

lar member. The vehicles are made in five sizes, the onc. 3.5 and five-on battery driven forms, and the 3.5 and nive-toton gasoline-electric types. In the latter, the gas enginedrives the generators, which replace the batteries, the wheels being the same, the only change being the method of obtaining the current.

The wheel, which is Illustrated berewith disassembled, is of bullow metal and carries the driving electric motor inside. The energy of this is applied to the wheel at two opposite points, with a balanced division of the work ecompilabed by two driving pinions, one on either side, this being effected by a device called an evener.

These two driving shafts constitute an extension of the motor armature in opposite directions, and carry small bevel

motor armature in uponosic university piptions, which mesh with very large bevel gears attached to the verterior metal cashings of the wheel. One moshes of the state gear, the other with the outside, the armature shaft being set as slight namely to allow action. This given the same direction of rotation to both parts of the wheel while large and like proposed to the state of the

speeds. The attachment of the axie stub on which the wheel turns, is made talegrain with the motor castlings within, so that an elongation of the inside stub, keyed in which will be a supported by the study of the inside stub, keyed in the control of the inside stub, keyed in the control of the inside study of the inside stu

This same construction allows of the wheel being turned around the knurkle pivot without interfering with the motor action or the transfer of electric current to the motor, it is the same for all With places against 17 in the smaller ear. The controller la of the stilled ear. The controller la of the stilled ear. The controller la of the subsets forward and a like number of the stilled earlier earli

In the gasoline-electric cars the motor replaces the battery as a source of current. A four-eyinder engine is employed and this with the generator is mounted on a sub-frame. A special generator is untilized and is rated at 12.5 kinovants at 10m volte, 80m reliable to the control of the cont

commutating poles, compound wound with desputing characteristics, which automatically assists the engine to hold or increase speed with the rate demanded. The rheostat is connected to the fields and carried on the dash in such a manner that the driver may raise or lower the gear ratio at will. On the 35-ton size the wheelbase is 144 inches and tread 66, the tires being 26 by 3.5 dual on all wheels. An electric brake is fitted in addition

to two sets of mechanical members.

On the five-ton vehicles illustrated herein, the four motors employed are rated at three horsepower each, giving a total of 12, but all are said to be equal to an overload of 200 per cent, which with the four-wheel traction is said to be equal to the ordinary 50-50 horsepower engine when drive is affected by two wheels only.



Couple-Genr Chassis, Designed to Carry Round Dil Tunk 14 Feet Long.

WAVERLY ELECTRIC VEHICLES WELL DESIGNED.

ELECTRIC commercial vehicles manufactured by the Waverley Company, indianapolis, Ind., are made in carrying capacities ranging from 600 pounds to three tons. The chassis of the latter size is illustrated here, also a fixet of mail wagons of 2000 pounds capacity, adopted by the l'aited States government. The larger vehirle is fitted with Waverley motors built by the company so that control of the companies of the of t

A double motor equipment is fitted, this bettin two series-wound, Swott members supported to the ables of the frame in heavy can steel brackets. These also carry the jackshaft bearings and brakes. Intrive from each motor to the countershaft is through a Renold allent chall, and filad drive by roller side chains. The primary drive chaline are enclosed in metal cases fitted with hand plates that may be removed casely for inspection or other purposes. Radius are provided with turnbuckies making adjustment a sim-are provided with turnbuckies making adjustment a sim-ple matter. Similty members are fitted between the outer code of the jackshaft to the art at each of the fackshaft and and lackshaft to the analyses of the provides a double alignment under all loads. The motor and lackshaft rotate on annual balls badfur rotate on annual radii bearing the little forties of the fact of the fact forties of annual radii bearing the little forties.

The frame is constructed of five-inch channel steel and the members are hot riveted throughout, with heavy guesset plates employed at the ends. The atles are of drop forged alloy steel, the wheel platon being ground carefully and fitted with Timken roller bearings. The from springs are semi-elliptic, and are anthord at either end to cast steel brackets on the frame and held securely to the axie by steel clips.

clips.

The platform type is utilized at the rear and all springs employed are of a special steel, the members being built up of a number of thin graded leaves. The rear sets are held forward in frame side brackets clip centred to the rear axis and bearing in free action hangers to the ends of the transverse member. The springs are long, providing east riding annulities.

Two sets of brakes are fitted, one on the rear wheels and the other on the jackshaft, both being operated by pedal. The wheels are of wood, artiller type, 26 inches in diameter, and the front members are equipped with solid five-inch single shows while the rear have 3.4-inch daal. A sector and philon form of steering is utilized, positive in action and having few working parts.

The Waverley controller is of the continuous torjue knife hiade type, and there is no interruption or break in the current in advancing from one speed to another. It is located under the driver's seat, and operated through a vertical rabber handled lever, which may be locked securely. Four speeds forward and a like number of reverse are obtainable by this type of controller.

The wheelbase is 118 inches and gauge 73 inches. With standard body the width of the clear loading space is four

feet six inches, and length back of driver's seat, 13 feet.

The Waverley Company builds a number of commercial



Chuasia of Three-Tun Electric Truck Made by the Waverley Fompuny, Indianapolis, Ind., Showing Loration of Meters and Marked of Delta.

vehicles ranging from 600 pounds entrying capacity to the three-ton vehicle described, and a variety of hodies are fitted to meet the requirements of various lines of industry. Quite a number of the 2000 pounds capacity trucks and other sizes have been adopted by the postal anthorities and shave given excellent service under all conditions. In addition to the business ears the company constructs pleasure vehicles. The Waverley motor is instabled in all models:



Fleet of Wascrier Electrics Lillined by the United Sinten Gascrament for Transporting the Wall,

PRESENTS STEAM TRUCK FOR HEAVY WORK.

THE AMERICAN steam truck is produced by the American Steam Truck Company, Lansing, Mich., in the fiveton size, for which is claimed an economy of operation and maintenance not possible with other types of vehicles. This concern and its product are decidedly new in the commercial car field, and a description of the machine will prove of canacial interest

The engine used is designed to develop 50 actual steam horsepower at 300 pounds pressure and 400 revolutions. It is of the twin, quadruple, compound, reciprocating type, assembled in the form of two complete engines in one casing at an angle of 90 degrees, the crankshaft containing a single pin at the apex of the triangle. It may be described as an eight-cylinder machine, four cylinders on either side, each group acting in unison,

The steam enters all four cylinders on either side in such proportions as to exert the same pressure on each of the four pistons, of course at varying steam pressures and at varying dimensions of the cylinders. Regulation is by means of a hollow piston valve, acting in conjunction and water reservoir below by the water level line, which is held constant. There are 40 1.5-inch drawn steel fire flues passing through it. The top and bottom plates, or heads, are .6875-inch flanged steel, securely riveted. Two hundred and forty patented seamless circulation tubes are Inserted in the bottom plate and extend 10 inches down into the furnace. A water leg completely encircles the boiler, having two brass plugs for cleaning the shell at its bottom. The generator is covered with a steel tacket lined with asbestos for economizing heat. Engine and generator are close together insuring slight condensation in transmission of steam

By the condensing system employed the steam that would otherwise be exhausted and wasted in the open air is changed to water, which is returned to the boiler in a heated condition and used over and over again, improving the appearance of the truck in operation and economizing on water and fuel.

After entering the engine at about 300 pounds pressure and 450 degrees temperature, the steam is expanded tour

times in the four cylinders and is then exhausted at low prossure and temperature into a .125-inch pape, which in turn connects with a 1.5inch pipe leading to a separator where the oil is extracted from the steam and the pressure of the latter reduced. It then passes from the separator through a ,5-inch tube to a feed water heater, where two things are accomplished; the water about to go to the boller after it has passed the pump, is heated almost to boiling point, and the heat necessary to do this is extracted from the exhaust steam, again reducing pressure and temperature.

From the feed water heater, the exhaust passes in pipes through the twin tank and into the bottom of the condenser at the front of the chassis, which li reaches partially condensed. It has travelled nearly 25 feet, is

practically devoid of pressure and has a very low temperature. Here, the work of turning the steam into water and also of cooling it is finished before it returns to the water tanks. The condenser has nected by thin copper tubes.

an aluminum top and base con-In operation, the steam is condensed in the rear half, while the water is cooled in the front portion, by the action of the air which is forced through the tubes by a large fan located directly behind it. To prevent any possible back pressure on the engine, two open pipes lead any unusual accumulation of air or steam to the stack.

The burner used is of the standard type, having two fuel feeds. The fuel is vaporized before entering the combustion chamber and as kerosene is entidoyed it produces a very hot, blue flame, which acting upon the drop tubes of the boller, generates steam quicker perhaps than any other liquid fuel.

The main flame is shut off at 300 pounds bolier pressure, by an automatic regulator which can be set for any desired pressure, and it is claimed that as the plant generates an over abundance of steam, the burner is not in operation more than two-thirds of the time when the truck is running. It is further claimed that the fuel consumed in furnishing steam for the vehicle will not exceed 15 galions of kerosene for a day's haul of 10 hours,

Pliot lights burn constantly underneath. With these



Power Plant of American Steam Truck, Including Generator, Engine and Borner,

with properly proportioned ports, in such manner as to prevent expansion in either ports or valves. Steam is cut off at seven-eighths of the stroke, the table selected being as foliows:

Cylinder	Diameter	Stroke	Inches	
Itigh pressure	25	5	1 '10	300
Pirst Intermediate		5	4,37	200
Second Intermediate	5.0	5	19.63	1.33
Low pressure		5	18.48	8.9

The engine takes steam through a .5-inch pipe at each end, exhausting in a tube 1.25 inches in diameter. While It is eausible of 1000 revolutions a minute, it has a normal speed of from 300 to 600, at a car speed of five to 10 mijes an hour. The reversing gear is so arranged as to permit instant reversal of the engine under a full head of steam. this being in itself a positive form of brake.

The generator is known as the semi-flash, drop tube, water level boiler. It consists of two parts, the boiler and the drop tubes, with a shell 24 inches high by 32 inches in diameter. Inside of this shell is the body of the boiler and the furnace. The former is divided into a steam dome above once fired the burner is always instantly ready to respond and keep the steam up to working pressure. This also may be maintained in cold weather, when the truck is left standing for long periods, by the pilot lights alone.

Owing to the fact that there is constantly 20 gallons of water in the boller, "Bring spi" with all parts cold is a longer operation tian by the full flash type, but it is claimed that after lighting the pilot lights, the operator will have a working pressure of steam in 20 minutes. When the burner is properly operated it is said to be smokeless.

An automatic regulator is placed on the sides of the generator, which commandly maintains the water an a stated level, as follows: The two pumps furnish water faster and in larger quantities than is necessary to supply the boller, and force this all of the time the engine is in operation. When the bind is bolten is proper become, they pump the binds of the sides of the proper because the pump level is reached the artion of the water in the boller (which is never hotter than 212, no matter low but the steam may be) chosen a valve in the regulator and the course of the water is changed, by passing back into the tanks, but jut make assarance doubly sure, a high presenter glass keeps the operation intermed as to the exter state of the water

Notwithstanding that the water, fuel and steam are all controlled automatically, arrangement is made for the hand control of these elements from the driver's sent. The state class is stationed immediately leddind the sent and

at once gives a normal mixture, even in the coldest weather, facilitating the starting of the engine. It was first produced by a well known chemist for his own use, but it proved an successful that it was placed upon the market. It is produced by the Quixtart Chemical Company, Providence, R. I.

NEW YORK'S TAXICAB REGULATION.

Adderman Courtlandt Nicoll of New York City has annonaced his intention of introducing a new ordinance, soon after the organization of the recently elected board in Jannary, reducing the present taskeds rate of 80 cents for the first mile, to 30. Vonceraing this matter his draft reside as follows: "For the first half-unite or any art thereof 30 cents; for each additional one-bird of a nule, 10 cents." The ordinance flew walling charges at 12.50 of the first cents for each additional half-hour. For a stop but excents for each additional half-hour. For a stop but exceding five minutes there will be no clare.

Just how this projection will be received by the taxicab companies is problematical, insurinot as they claim to be operating on a close margin indeer the present charges. Still another phase of the situation in offered by the proposed ordinance, in that hereby, rathroads, clubs and prestamatis will be compelled to accept the service of vehieles, even though such calse are not owned and operated by the commany to white the service privilers has been sold.



Chassis of American Steam Pive-Ton Truck, Showing Complete Assembly of Paris and Their Helation to Each (ither.

all gauges on the front of the dashboard. The steering wheel is located on the left hand, and the throttle attachment on the steering post consists of a short lever at the left. Opposite this and fitted to the same collar is a similar lever for reversing the engine. Two long levers operace, respectively, the disengaging clutch and the brake. No trammission in nucl.

The power plant, engine, enerator, burner, etc., are enchosed within the cab. A chain driven air pump, mainiaining automatically 60 pounds pressure in the 30-gailon tank, located under the bed and over the rear axlee, is used to transfer the ford from tank to burner. The water supply, of 20 gailone causetty, each located automatics,

The chassis is constructed of six-linch channel from bed. All Jackshaft and axie bearings are of the Tinken roller design. Swinehart tires, 4.5-linch dual rear and live-linch front, are fitted. Any desired form of body can be furnished according to the wishes of the purchaser.

QUIXTART STARTS COLD MOTORS.

A new compound called Quistart has been placed upon the market recently, and is used as an aid in striting gaseline engines when the cylinders are cold or when the spark is weak. It is said that by its use much time may be saved in cranking as a small quantity of the material poured into the carbureter, assillary sir valve or intake avstem Under the present plan the transportation companies pay more than \$300,000 annually for these privileges, as evidenced by the following table, prepared by the comsioner of accounts:

Mason-Season Transportation Company	.8110-517-04
Car & Taxl Cab Company of New York	50.516.13
Connection Cab Company	. 52 157 96
New York Transportation Company	
Pulversal TaxImeter Cab Company.	20 075 00
Benault Taxi Service	11 196 19
James T. Haverty's Stable	11.752.58
Keyton Taxleab & Garage Company	7.5 (2.78
U. S. Motor Cale Company	9 500 000
Patrick W Haurahan	3 500 000
Long Acre Motor Company	1 477 44
Carnegle 1101 Livery & Motor Company	1 965 12
New Taxlenb & Auto Company	Jan 14 4 4
Thotoas Comba (approximately)	1 Sept 00
Joseph H. Penilirs	1 200 004
Frawley Transportation Company	1.200.00
Crutes, Keelan & Co.,	1 1100 910
Hart Bros. capproximately:	CHI III
B Van Cott	61111 1919
Nattus Taxleah Company	2010-003
Franklin & Itsan	1.25 (0)

Not all of those concerns operate motors, and the ordinance is not aimed at such vehicles alone, inasmuch as it reduces the charges for horse drawn cabs as well. It is probable that both classes of service will unite in an effect to prevent list passage.



VOL. III

NO. 1.

AUTOMOBILE JOURNAL PUBLISHING COMPANY Times Bldg., Pawtucket, R. 1.

William H. Bluck, Treasarer. D. O. Black, Jr., Secretary
Publishers of

THE AUTOMOBILE JOURNAL THE ACCESSORY AND GARAGE JOURNAL

'Phone Pawtneket 1000,

EDITORIAL DEPARTMENT:

CARL A. FRENCH. C. P. SHATTI CK. WILLIAM W. SCOTT,

ADVERTISING DEPARTMENT:

John W. Queen, 6 Hencon Street, Boston, Muss, Central States—

W. R. Blodgett, 25 West 42nd Street, New York City. 'Phone Brynnt 3728.

Western States-

G, A, Eldredge, 304 San Building, Detroit, Mich. 'Phone Cherry 1853.

P. G. Luriau, 1614 Belle Plaine Ave., Chicago, 111.

PUBLISHED THE FIRST OF EACH MONTH.

SUBSCRIPTIONS:

The United States and Moxico, the year, \$1 in advancet Canada and Foreign Countries in Postal Union, the year, \$2 in advance. Fifteen cents the copy.

ADVERTISING RATES.

information given on request. All advertising copy must reach this office not later than the 25th of the month preceding.

Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire, and municipal apparatus, the motor industry and the trade, will receive attention. Btamps must be enclosed to Insure return of unsolicited

Entered as second class matter, February 25, 1911, at the Postoffice at Pawlucket, R. I., under the Act of March 3rd, 1879.

CONCERNING THE COMING SHOWS.

Business men who are contemplating the installation of power wagon equipment, will find inuch of valne in a visit to one or more of the so-called national shows. At these it will be possible to study the merits of the productions side by side, with every opportunity to consider the advantages of each with reference to its application in the particular work to which it is proposed to apply it.

While the motor truck may be regarded as having passed the experimental stage, its thorough practicability and dependability having been demonstrated under all sorts of conditions and in every application of service, it undoubtedly is true that the forthcoming displays will bring out a number of refinements in design and details of construction which may be considered as new. It is reasonable to expect that the commercial vehicle will pass through the various stages of development in much the same manner as did the so-called pleasure ear, but with this exception, that the industry has been able to learn much from its experience in the older field.

It is somewhat difficult to forecast the features which will be considered important, inasmuch as each business man will be guided largely by his own needs in arriving at a decision on this point. It is perhaps safe to suggest that the effort of the manufacturer will be largely toward economy and reliability, for it must be admitted that he shares with the purchaser in the desire to bring about such results. Every truck sold which presents a satisfactory record in this respect means that it will be that much easier to place others and it is sufficiently well understood that the possibilities for sales are as yet quite unlimited.

TREND OF SELLING METHODS.

Those engaged in the business of selling commercial motor vehicles appreciate thoroughly that absolutely nothing is to be gamed by an attempt to discredit the product of other makers. There was a time when this fault was rather too prominent, but it was soon recognized that the good of the industry demanded it be eliminated forthwith. At present, the trend is notably along lines entirely opposite.

The action of at least one motor truck manufacturer in establishing a campaign of education, in which the object is that of interesting inerchants and other business men in the advantages to be obtained by the adoption of the mechanical transport, without special reference to any particular make, is a decided innovation. There can be little doubt, however, that the ultimate result will be most satisfactory to the concern which inaugurated the experiment.

Few will be disposed to criticise the statement that the industry needs some such means of calling the attention of the general public to the specific opportunities afforded by its product. That conditions have reached a point where it seems advisable for the manufacturer to devote a share of his investment to this purpose is sufficient indication that the business of producing commercial vehicles is on a stable foundation.

NEED FOR SPECIAL BODIES.

Hody design is a matter which is receiving deserved attention on the part of those interested in the future of the industry. There can be little question that the body equipment is quite as important as the classis, and there is every reason to believe that a field is opened up in its consideration, which offers a splendid opportunity for certain lines closely allied with the horse drawn vehicle, destined to be superseded in a large measure by the motor transport.

Special bodies, in this instance, should be taken to mean those carriers which are to be used in special service. It hardly can be denied that the coal business, for instance, requires a different construction than would apply in the hauling of lumber. Each particular line must be studied with a view of bringing about designs that will apply especially thereto, having in mind the economical operation of the truck. And this will be found to cover a much wider range than is apparent at first thought.

Whether or not the manufacturer shall attempt to solve the problem himself, or call upon the already organized body builder for aid in the matter, must be decided by each in turn. It may be suggested, however, that if the latter course be chosen, the two ean work in conjunction without conflict. In fact, it is quite possible that the body builder may be able to offer valuable assistance, because of his long association with this particular branch of his industry.

THE A B C OF MOTOR TRUCK OPERATION.

A Simple Exposition of the Principles Underlying Operation, Maintenance and Repair of All
Motor Driven Commercial Cars, Outlining Details of Components.

Part XIV—Necessity for Clutches and Their Forms.

By Morris A. Hall, M. E.

HAVING considered the paris entering into the construction and operation of a motor truck engile, including its form, cycle of operation, means for a supply of fuel, a source of jaintion for this, and proper and efficient lubrication, there remains the use of the power developed, list transmission to the road wheeks so as to propel the vehicle, and means for controlling its application. An important member in this group is the clutch, interprote between the motor and the changes speed mechanism. The operation of the properties of the properties of the properties a number of period and the changes speed mechanism. The operation of

A gasoline or other type of internal combustion engine has a limited output of power for its size and form, the varying sidely from one unit to another but each possessing a self-defended maximum, beyond which it is impossible to go. If a load be placed upon it in excess of that, the contine will stun and eclase to work longer under the Lower limit, sun-our eretolutions a minute; inpure extreme, Loon. Below Sou turns, the power developed will be exceedingly small, and hear a very low ratio to the possibilities above that point, and what is of much greater importance, to what is needed for the proposition of the car. Let it be assumed that at 550 revolutions the output would be but helf of that at 800, the latter in turn, beine but 66 our cent of the maximum.

If the total be needed to start the ear from rost, which is reasonable, for it all cases of operating vehicles whether they be railroad trains, trolley cars, or motor trucks, the movement from rest takes many times as much energy as it does to keep it in motion after it has been started, then the highest speed also will be required. This necessitate a form of the former being started and run alone, until the maximum seed of rotation be reached, and conse



Fig. 55—Cork Inserts Form One-Plate Cintch Used in All Knox (tens) Motor Trucks—Note Numerous Springs in Contion
Within Provides

conditions. This necessitates a form of connection between motor and driving group which will permit of some slippage, sufficient to avoid stopping or as it is called commonly, stalling the engine. If this could be designed and constructed so as to hold right up to the ultimate maximum of the power unit, and slip as soon as that were exceeded by the slightest amount, it would be ideal; but such is not the case, as will be shown later.

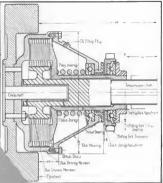
The hydrocarbon power generator must start slowly, at which time the output is very small. As the speed increases, the power developed is sugmented in a proportionate rate. That is to say, the work which such a motor can do varies with its rotative speed, this being large between certain limits, small when the nguer end is passed and very slight at the lower point. The interval between the two is called the critical range.

To be exact, this differs for each and every engine produced, but a general statement may be made as follows

quently the greatest power developed, when it must allow of connecting or joining the two gradually yet at the conclusion of engagement, decisively.

After slowing down the ear, too, the starting up again must be considered always, since if the minor speed he reduced to a very low figure, while the vehicle is brought to an actual atop or very close to it, the stratum or the same as in the first place, and the engine most be disconnected, speeded up to a hist power output point, then connected with the driving means. When the large number of states and stops made during the coarse of a rome mercial vehicles day is emissible during the coarse of a rome mercial vehicles day is emissible d, the importance of this casy and rapid connection and disconaccioned becomes apparent. From this point of view the statch is a large factor in succeeding and efficient operation.

The clutch fits into the niche created to these three fundamental needs of the motor car, namely. First a slipping member to avoid overloading and consequent soil.



) Plate Clutch of In Dises for Severe Hailway Car Service-Note Bugged Design,

cond a disconnecting unit to permit of runendent of the rest of the ear and so bring development necessary for starting and third, a form of flexible connection ration at all times is facilitated

to the ourset that it is chosely commethod of speed variation used, form of the latter is such as to spearate unit, the transmission is the functions of both. In friction type, the planetary of other similar demmon use, they friction and

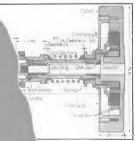
three principal value, motor, clutch and transmission, as individual parts, and in the impirity of cases, placed some distance apart. On those of the chain driven type, the gracine is located at the driving countershift and many times, as a unit with it. Between the two the clutch position varies with the designer from very close to the power unit or theory properties of its case, back to include with the transmission, size, and all of the intermedial locations.

This being rine, it can be discussed separately. There are three classes into which all clubron may be divided like, come, or band. The first is divisible into discle plate, secondled, with three feiting surfaces, and multiple disc with inpured of 10 plates. The second form may fall in one of two divisions, the plate or the inserted come. The last also is made in two ways, the contracting band and the exampling.

The next class is well represented in the accumpanying runs, Fig. 5.3 showing a nucleit form, Fig. 5.4 another with 18 showing a form with 11 plates and Fig. 5.4 notes with 18 shows, Fig. 5.5 a form with 11 plates and Fig. 5.5 one with 15. While the power transmitted in the case of the direct plates in the plates like sharely in size and he greater of the clutch spring. The single disc is of a very large size, within a portion of an inch of the five diameter, while the springs though shall are numerous and stiff, yielding a large total pressure. The form sho has over largest, which supply the larger part of the fit time surface, thereby the surface part of the fit time surface, thereby the Knox Astronochic Compan. Springfield, Mass., in les tracks and commercial cars.

Fig. 54 is a design of the writers for a finite powered gasoline rallway are to array 75 insessencers. The plates were of a very ordinary grade of brans, east with the proper lugs and machined only on the contacting faces. The entire join was a very low priced one, but the surface afforded a large margin over any nosuble requirements, By comparing the size of the flywheel here with that of Fig. 53, some blea of the relative dimensions of the two kinds of discs may be gained, atthough this last is a slightly farger balance weight, and 21 inches as compared with 18. The balance weight, and 22 inches the considerable abuse. Attention is called to the two polatics of external adjustment of the clutch spring and outside take-up possibilities for the shifting forth trust bearing.

Another with the Shriving roles culture services, but for a lighter vehicle of mixed been power in this of Pig. 5a. Here the property of the property of the property of the control of



Cinich, Illustrating Special Design

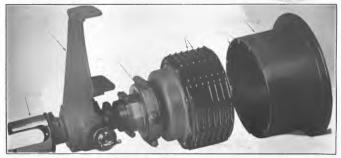


Fig. 36—Type of Multiple Disc Flutch in Which a Large Number of Plates Is Used-Those Shown Are Fueed with Heat Proof Mulerial.

driven members each have a hub twice the thickness of the pible, in which is a set of three notebes to accommendate an equal number of keys on the driven staft. The universel compling at the left was provided for the purpose of quick and easy demonstrate. By removing a pair of the both hotting the law cashing pieces together, these could be lifted off the squared ends of the shafts over which they can be a first of the property of the control of the squared ends of the shafts over which they end any of the juris. The spring is of a round section wire of fair size and considerable stiffness.

A series of 15 stamped steel sheets, seven with external northers and eight with Internal, form the principal parts of the clutch depicted in Fig. 56. These have a facing of assents fabric, similar to that used for brake limings. Other features of this design will be seen in the figure, which is well worth extended study.

Passing to the cone clutch. This may be considered as a dise which has been rolled my, cornscopia shape and the ends cut off. Treated in this manner, it becomes similar to the dise in every respect. The actions of engagement and de-hitching become a matter of allowing the spring to pash the two cornel surfaces together or pressing them every only the property of t

amount of power. Fig. 59 depicts a plain cone so that a means of comparison is afforded

The reversed form calls for more parts and has an enclosed spring, permitting of efficient lubrication. The design shown in Fig. 59 of the plain form also happens to show an enclosed spring, but generally this type gives an external position for that important member Fig. 57 is used in one of the best three and five-ton trucks on the market, while Fig. 58 was designed by the writer also, for a 36-passenger railroad car with a peculiar donble transmission. The form in Fig. 59 is used on the Sampson five-ton vehicles made by the Alden Samoson Manufacturing Company, Detrolt. Fig. 60 shows a detail of the clutch spring used in the Sampson truck, giving an excellent idea of its proportions, while the preceding figure deplets it in position. The spring in the Mack design at Fig. 57 nexared 3.25 these inside disneter, using 5,75 the square wire. It was 5.75 findes long free, and required 2.25 pounds pressure to bring it down to the original form the first long free of the first long free or the first long free or the first long free or the first long free fir

Aside from the Kelly track, manufactured by the Kelly Motor Track Compans, Syringfield, O., few band clutches are used in commercial cars. This one is of the expanding form, in which a construction very similar to the usual expanding brake is utilized. The drum is driven from the engine and the band is attached to the driving shaft. By forcing it to grip the drum surface, the whole is locked together and revolves as a unit, which is the desired end.

The selection and adjustment of clatch springs is a delicate matter; if they be too free, the member will not take hold, allipting will result, and the engine will be raced to get the desired speed, eventually causing much damage; if too tight, it will grip so quickly and strongly that the car will start of with a perk, taking the engine if let in drivers are advised to avoid tampering, with the spring adjustment so long as the part acts correctly.

Similarly, with the friction surfaces: These should take

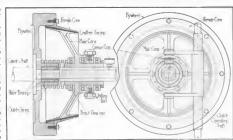


Fig. 57-Standard Type of Inverted Fone Fluich with Enclosed Spring, But External Adinstruct, Lord on Mark Trucks-Operating Fork at Right.

hold easily, genily and progressively, but once gripped together should hold right up to the ability of the engine, of should be suffaced and the surfaces may be too greasy or the lesither or other facing may have become oil soaked. When this occurs, it is well to take the member out, clean the surface as much as possible, then soak over night in the uniform that the surface is much as possible, then soak over night in line, and it will be ready to replace. While the part is out of position, roughen the surface with a coarse file. For the first few days, a fine powder may be put on the surfaces, but sand or any gritty form should not be used. The use of powder is inadvisable except as a last record.

Ed. Note—The next installment will take up the different forms of devices for varying the speed, showing the need for these, the types usually encountered, a number of common forms and their operation.

MILLER'S ADVANCE CATALOGUE.

Those who have come to rely upon the catalogue of Chas. E. Miller, 97-103 Reade street, New York City,

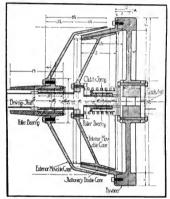


Fig. 58-Double Cone Clutch of the Inverted Type, a Peculiar Form Also Used on a Bullway Car.

for information concerning automobile accessories, parts and supplies, will he glad to know that 190,000 ecquies of the advance catalogue No. 21, for 1912 have been printed for distribution at the forthcoming shows in New York City. As has been true in the past, this is undoubtedly one of the thing the control of the co

NEW HEWITT COMPANY FORMED.

Papers have been filed in Alhany, N. Y., for the incorporation of the Hewitt Motor Company, with offices in New

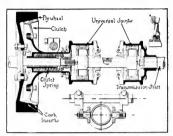


Fig. 50-Straight Type of Cone Cintch with Cork Inserts on Sampson Tracks, and I alvernal Joint Construction.

York Cly. The original concern of this name was one of the ploneers in the commercial swinder industry, being one of the first to produce light delivery wagons and neasy trucks. In January, 1319, It was combined with the Metzger Motor Car Company of Detroit, and Hewitt trucks were sold through that concern's commercial vehicle-department at 10 East 31st street, New York City, Edward R. Hewit, Chapter Ch

It is understood that the new company has jurchased the Metzger Motor Car Comjany a interest in the truck end of its husdress, and will begin the manufacture of Hewitt vehicles under its own name at West End avenue and 64th street, about Jan. 15. The directors of the new concern are: M. F. Barns, E. C. Converse, William E. Corey, E. R. Hewitt and Ambrose Monel.

BIRMINGHAM INCREASES EQUIPMENT.

Perhaps no city in the South bas given the subject of motor transportation more study than litrimistana. Ala. It will be recalled that the fire department practically has replaced its entire horse equipment with automobile apparatus, and now it appears that Commissioner Westheriy of the street department is about ready to follow its example with respect to vehicles for his work. He says the greatest lem of expense is that of transportation, and if that they have for the fire wagons he will be justified in making the experiment.

His investigation leads him to believe that one motor truck will do the work of three teams of six muies and three drivers. While no official statement has been given out, it is understood the city contemplates the purchase of five or six automobiles for this department, one of which will be of sufficient strength and durability to handle the garbage problem of the city is a satisfactory manner.

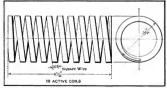


Fig. 60-Hetali of the Spring 1 sed to Operate the Sampsos Clutch Previously Shows.

POWER WAGON BODY DESIGN AND CONSTRUCTION.

Service Vehicle Equipment Building an Industry of Large Proportions—It Requires Engineering Skill and Knowledge of Chassis Details, and Entails Specially

Developed Facilities to Produce the Special Works.

(fly William W. Scott.)

THE utilization of the industrial power wagon has made assential specialization in body construction. This has pleasure are booles. The possibilities it affords are seeningly smilmited. To illustrate this It may be pointed out that with the greater number of manufacturers of piessure vehicles from two to a balf dozen different bodies are used. There are others who may make a dozen or more types, but all of these are not generally stocked and some are supplied between the properties of the prop

The European custom has been for years to deliver pleasure car chassis to purchasers, not furnishing the body unless a few standard types are demanded.

The fact that the makers of industrial vehicles have preferred to devute themselves entirely to construction of chassis, and that the buyers can secure bodies that are in every way satisfactory from those who specialize this work, has developed industries that have assumed considerable prominence. Sume of these body makers will take orders for all types of construction, while others will only accept orders for wagon and truck bodles. These specializes



Power Wagon Chassis with Special Body Equipment for Wildely Differing Service, Either Built or Installed by the Monthau Vehicle Company, to the Yard of the Works,

erations—manufacturing cheapiy and to reduce the factory equipment. Those who purchase pleasure cars must select the type that is offered or pay for specialization, and special work always costs money.

The manufacturers of pleasure vehicles who began to install bodies on touring en or roadster chassis found that it was not practical to build stock bodies that would meet with approxis. So many changes were demanded from the designs created that it was decidedly impossible to give the attention to special work with the ordinary facilities. Then construction to special work with the ordinary facilities. Then construction to special work with the ordinary facilities. The construction to special work with the order to give the special construction of the special change of the special change for the size of the special change from the usual method of factory production.

This condition made imperative abandoning special work or equiping factories to produce it, and this led to very general recommendation that the chassis only be delivered to the buyers, they to have the bodies built by local builders who could produce these to exact requirements. Many motor truck manufacturers found it desirable to go outside of their own factories to have bodies constructed to specification and did so to severe equipment for show purposes. may have been waxon and eart builders, or perhaps firms that were enterprising and realized the fullest leaseft from the change from the animal to motor transportation, while others may have taken up a work that has been especially promising.

While those who have adopted motor vehicles for industrial purposes realize the desirability of bodies adapted for their needs few understand that there is quite as much engineering knowledge and practise necessary to produce a good body as is needed to build the chassis. This is not intended to discount the motor vehicle engineer, but to emphasize that high class work to yield service and endure under differing conditions of use must be built from well selected materials, to correct designs and to established engineering principles. Not only this, but to give the satisfaction desired a body should be designed for the purpose for which it is to be used. It may be assumed that a single type of body might be utilized for a great number of purposes, which may be true, but this could only be applied to instances where the work differed as in general hanlage, and where as equipment is with reference to diversified mervice

It is not to be assumed that body building has been

fully developed. As a matter of fact the progress, so far as power wagons are concerned, relates to the requirements of a small proportion of these who have utilized highway vehicles for business. It is rare indeed that stock creations

to incorporate in the one vehicle what will give them equipment for widely varying service, and to nicet such requirements impels careful study and a knowledge of As an llinstration, frequently a fittings and accessories.

demand is made for a combination that will afford both freight and passenger service, or for the transportation of two forms of commodiries, such as grain and lumber, or contracting materials, or coal and merchandise. An example of the develop-

ment of body building to specification is Hinstrated by the Monahan Vehicle Company, Providence, R. i., which has for several years built bodies for power wagons and trucks, and which has distributed its products all over the country. This concern was originally engaged in constructing animal vehiejes, generally of a business character, and with the adoption of the automobile to Industrial purposes demand was made for bodies, for the first machines to be used had been given more or less service for pleasure. This necessitated the creation of whatever would meet the requirements of the owners of the chassis, within the limitations of the original construction, though it was often nec-

essary to make material changes and modifications in the ideas originally outlined by them.

This work was largely of an experimental character

because of the lack of knowledge of service conditions and

with no experience save with animal conveyances. With

this foundation other work was undertaken. The pro-

duction of power wagons was begun and this created a

demand for special bodies for varying purposes. The total

of differing demands made upon the concern in the period

it has engaged in this work is not certain, but it is safe



Section of Woodworking Department, Where the Rough Stock is tut and Formed for Body Lomponents to Specification Requirements.

are produced. With few exceptions the bodies built have been to meet the needs of individuals, the ideas being developed by practical designers and builders.

There is in service construction much opportunity for creative work, but ornamentation gives way to simplicity, for at most paint and varnish can only please the eye and add nothing whatever to productiveness. It is not possible to construct a stock of bodies and to deliver one or more when a customer makes demand, because there is usually so much variance. Not only this, there are quite as many

differences in the chassis as there are in ideas, and it would be the height of folly to attempt to sell what is not wanted at a price but comparatively little less than what would be charged for a special order. What is wanted in a body is, as a rule, substantiality and capacity, and yet it must have an appearance that is not unsightly when contrasted with all or many other types.

It may be emphasized here that there is with many a desire to have what will attract public attention because of the advertising benefit that may be derived from the constant use of vehicles in a community. Just what this value may be is decidedly uncermain because there can be no measure applied to it. There is no question that public opinion is aiways desirable, but prestige is mainly sought by those who do business, and this means favorable comment. This develops the fact that the body bullder who would must be able to produce what

will have every desirable quality of other forms of vehicles, be sufficiently original to develop what will serve all other purposes as well, and yet be governed by competition so far as the price is concerned. Not only this, some men derire



please and attract patronage tauther Wood Working Division, Where the Body Parts tre Finished and Each Job In Made Hendy for the Assembly

designs have been produced. The exact number would be interesting to know, but as it now does business the company has catalogued no less than 40 different designs in 149 different sizes of body which are classed as regular or standard products, all of which may be fitted to all pleasure and industrial chassis. This, however, does not represent the possibilities of construction, for the concern is prepared to undertake whatever may be desired. While the number may seem large it may be said that this does not represent by any means the extrences of the demand for service machines, and it is well within probabilities to state that there are at lend 50m bodies in use that may be regarded as business types. This is a far greater number than is to be found with pleasure vehicles, both horse and

Besides these the company produces bodies that are designed for heavy work and it has recently turned out a number of equipments that are for exhibition purposes. These will be seen at all of the principal shows this winter. Some of the bodies are of wood, some of factal, some combinations of the twa. The capacities range from 1000 to 16,000 pounds, and it might be said that the only limitation is the propertions of the chassis.

The first consideration in body construction is the use to be made of the vehicle. No matter how experienced a man may be with his service and how carefully he may have pinned he tacks the knowledge of actual body building that is essential in establishing even fundamentals. As a

matter of fact it is often best for a man to consult a body building firm just as he would an architer, which he desires to erect a house or building. He may know what he wants in a general way, but to sevare the best that is possible with the limitations of the charge which will be sometime to the service of the worked out whom exact knowledge of the service, the highway conditions, the character of the loads and the construction of the charge it seed.

To illustrate this an instance may be cited when the first truck chassis produced by a leading manufacturer was purchased by a very large concern and the purchased expense decided to have a body built by the Monahan company. An executive visited the works and described in detail what he wanted the asked of on neutrante and was econingly disposed to dismiss and his broad order. The design ear of the firm notes the design and his broad order. The design er of the firm notes the design and his broad order.

the details of service. Then the chassis was examined and its dimensions learned. With this a body was designed that, when submitted, was pronounced by the manufacture to be exactly what he wanted, but as a matter of fact it was in every way different from what had been described. Not only was it impossible to build what had been first ordered, but from an engineering viewpoint it would not have endured. The designer learned the requirements and then adapted them to the chassis with exact knowledge of mitrefinis, construction and the service, producing what was also sightly and service and a string contraction and the service, producing what was also sightly and service standard and the service, producing what was also sightly and services.

In industrial service II is often necessary to create what will be a combination weblice, that will serve for more than one purpose, and sometimes these purposes are so widely different if would appear that desirable results can only be obtained by sacrificing essential qualities. In either, II is not the owner who is qualitied to decide such propositions, and the owner who is qualitied to decide such propositions, shifting. It is not understand the limitations and the possibilities. It is not understand the limitations and the possibilities. It is true that chassis are built for differing purposes vice. It is true that chassis are built for differing purposes but the measure of capacity is by load only, not by proportions. Then in making installations to meet the desires of the purchasers it is necessary to be governed by certain nechanical conditions. Were it possible to take a chassle of a given make and capacity and lengthen or shorren it, or make it conform to body proportions, that would be ideal from the tivenjoint of the purchaser and the body builder. But as a matter of fact such changes are rarely possible and the body builder must produce what with best serve the purpose of the owner with reference to the limitations, for with the majority of the manufacturer changes in the chassic statement of the manufacture of the majority of the manufacturer of the purchaser arguments that can be made by the builder for the gale, and by the purchaser for the purchase of the truck

It is apparent that no such conditions govern the construction of the animal vehicle. There is nothing to be considered save the storage space or the area in which it is to be touded or unloaded. The limitations as accepted for animal vehicles by manufacturers are generally established by the makers of components, such as attes, wheels, and the like. With purchasers the capacity is gauged by custom or by supposition. The metal sow is designed for inraving and strengthening the construction without particular reference to anything else than endurance. The wood work is cut to pattern and assembled with service as the chief exceptint. So for an adesign is concerned any work may be



sires and inquired fully into Looking Through Our Side of the Blucksmith Shop, Showing the Tool Equipment and a the details of service. Then the Bolater for a Pierce-Arrow Truck to Have a Five-Too Dumping Body.

varied to serve any requirement and there is no probabilition as to adaptation. With manufactured vehicles certain types are selected as best meeting with the demands of the people and these are built in such quantities as the market justifies. These are carried in stock as standard products by while dealers.

While it is certain that there eventually will be as largeby diversified production of mechanical industrial conveyances as there has been in some instances manufacturing of animal transports, it is equally certain that there will be a considerable of the control of the control of the control of vorce; the body work, even of other control of the vorce; the body work, even of other control of the control on trequire more than casual observation of conditions and needs to establish beyond question that pleasure car chassis building and body construction are being more widely separated each year. While the business of the one governs the other it cannot be denied that the two are separate in.

There are lives who demor at paying the prices demanded for special body work. It is held by them that there should be the same relative cheapiness to be found in stock productions. The contention is made by men do do not hesitate to pay well for animal vehicles that because an installation must be made on a classification with

Digardo by Google

hought outright the first cost of a body is high. As a matter of fact used is not the case. The chasels is add without equipment and in competition. To the price of the chasels must be aided the value of whatever body will serve, and this body would cost the chasels manufacturer no less, and probably more, than it would were it built by the exclusive builder. Any customs work must of necessity cost more than what is manufactured in quantity, but there is not the usual wide difference between the two to be found in motor wagon body huilding.

While this difference would exist were each body a separate creation and were each designed especially it is apparent that where designs have already been made, which may be utilized, or slightly modified to meet requirements of the customer, the exclusive body maker is prepared to give the henefit of his excircince and facilities at what may be regarded as moderate cost. The hody making firm is as a rule better prepared to give service than is the chassis builder, for with it design and construction have been determined by the construction of the construction of the contraction of the construction of the construction of the contraction of the construction of the construction of the contraction of the construction of the construction of the contraction of the construction of the contraction of the construction of the construction of the construction of the construction of the contraction o to make adaptation to one's use. It is this that has caused the demand for differing creations, and it also is a very human desire to be satisfied.

But, as has been pointed out, it is quite impossible to have every requirement within the construction possible on a single chassis, and furthermore it is not possible to take a chassis and change it to permit the installation of a body such as might be wanted. Then obviously the one means open in to purchase the chassis that will merset meet the of expense of chassis and the cost of the body, to say nothing of the transportation charges.

As the subject of body huilding is considered it is obvious that there are some types of chassis that more nearly meet with the recognized standards of body builders. It is possible that in the designing of these chassis more attention was given to the probable uses and the demands of the purchasers, and some thought may have been devoted to the problems of the body designer. It is seidom, however, that a power wagon chassis is bought with an idea



A Glance Through a Corner of the Trimming Department, Where the 1 pholetery is ful and Made 1 p and the Tops and Curtains are Made Ready for Installation.

is often to order from body builders who are compelled to charge special prices for what is justly regarded as purely custom work.

There are in the Ubited States nearly 200 different enterprises building service vehicles and these produce from one to nine different types of chassis. A list of 50 of the leading concerns recently analyzed shows that these firms built at the time the compliation was made 150 different types, and the second of the second

It undoubtedly is a fact that there is no limit to the variance of requirements when each purchaser selects what he desires. There may be limitations, but these are not often considered or regarded, so far as conventionalities concerned. There is a distirc characteristic of human nature to limitations whatever is brought to one's attention.

which it is to be utilized. It is hardly necessary to point out that durability and economy of operating expense are the essential factors that indisease the majority of the men who hay mechanical transports. Often decision is reached only after careful consideration of every phase that has presented itself, and then it is found that the most vital quality. that of body installation, has been overlooked.

This oversight may be from the ignorance of the owner, the neglect of the agent to give the body the altenilon this detail deserves, or the assumption of the buyer that a manufacture or hold by builder can make any provision whatever to meet requirements. It is extremely probable that the average maker of bodies is better versed as to the possibilities of each make of chasels than is any given chassis tilded of each make of chasels than is any given chassis the probabilities of the purchase with reference to the possibilities of the chasels some exceedingly useful advice mithe be obtained.

As has been stated the buyer has need of specific services as rule and in the selection of a machine will perhaps color follow his own judgment, or may be guided by the experience and advice of others. Let us assume that the chassic designed with the greatest care and that it is constructed with reference to design. Every component is proportioned with knowledge of the requirements up to maximum lead and a reasonable margin of safety is provided. But let the chassis ought to be used as purposed by the designer. The load must be carried with the weight distributed on the chassis and on the tires as was designed, for were the freight more one carried with be undue or unequal stresses.

differing parts and weaknesses might be developed. This statement has been made because the subject of the chassis is first, last and all the time, and the design of body equipment is dependent upon the chassis and its arrangement. The statement has been made that engineering skill is just as uccessary in currect body building as in the production of the chassis. This may be emphasized by pointing out that a mechanic may produce a mort vehicle, and the same man may build its body, but neither will be as finished nor as satisfactory as were they constructed to recognited detail and by adequate tool and machine facilities. Nor will either be as accretible when offered for saic.

While the usefulness and value of a chassis may not be affected by the character of the body installed appear it is serviceability will depend to a large extent upon the form of the equipment. Obviously then it is desirable bave what will give the greatest measure of service. In bodies in which but one purpose is to be served it is one or 50 a day there is no change made so long as this type or types are turned out, and it may be that one change a season is all that is made. As a matter of fact in some instances the same type has been made for several years. It is certain enough that manufacturing under such conditions means minimum of expense and uniformity of work, two excellent factors from a business solut of view.

The power wagon builder must have even greater facilities than has the body factory, for each work turned out is in itself a separate order. This in a nutshell shows why it is that the cost of the service body is necessarily more than where bodies are manufactured in considerable numbers The plant must be sufficiently large to undertake whatever commissions are received. It must have a drafting department and capable men must be employed who are competent to produce whatever is desired. They must have greater and more diversified experience than those engaged in ordinary body manufacturing and not only have a careful engineering education, but be familiar with the design, construction and requirements for each type of chassis upon which they are called to work. This means that they are specialists in every sense and capable of taking any problem of vehicle design, including both chassis and body, and successfully solving it. This work is broader than that in



in the Pataling Shan, Shawing Hodies and Change to Varying Degrees of Finishing, These Bring all Pleasure Cara-

difficult to determine what form will best be adapted to requirement.

Itody building for power wagons as an industry means that there must be factory facilities, but not of the same character as were pleasure cars produced. Where several types are standardized, as with a complete automobile plant, or where many types are hullt in large numbers, as in an exclusive car body establishment, manufacturing methods to standard patterns and templates and by specially fitted machinery must be adopted for economy and profit. This means that the work is departmentalized, beginning with a drafting room, where the bodies are designed, or where the working drawings are made, and including the wood working divisions, the tin or metal working shop, upholstery and the painting and finishing rooms, each as complete as may be required by the character of the work produced. With these after a design has been determined the body is completed according to a regular working schedule and it becomes merely a manufacturing proposition

So far as detail is concerned a body is created to have certain appearance and is to specification. Each is assumed to be equally good and to differ not at all. Where there is special work this may apply to a change in color, or perhaps in the tone of the leather applicatory, or possibly a materials are identical. While the number built may be which the motor vehicle designers are engaged because it is not one but a succession of problems in each of which economy, service and appearance are all important factors. As must be evident these men are not easily secured, for there is no education that will fit them and their knowledge must

be gained from experience.

After the designing or drafting room the facilities must be complete in every way. First is the wood workers, where workmen must be capable of taking a blue print and from it forming the different wooden parts, not to patterns or templates, but to engineering dimensions. In this work the men necessarily must be of experience and capacity. It may duplicate. Such work is not as rapidly produced as is one series of part, despite experience and high class facilities.

Next is the machine shop in which all special from and steel work is produced, this from the parts in the rough or by adapting whatever of the constructions may be available. The machinists must be skilled men who can undertake any job and do it well. They must have ample facilities. The work may be for the heaviest truck or for the lightest and

The third department is the blacksmith shop, one of the most important, because each work requires special construction, differing in size and form, sud shaped from iron or steel, which must be produced by hand. These men must

be able to take a blue print and make whatever has been designed to exact proportions, just as are the wood workers. So capable are skilled men that they can from drawings make what may be installed without fitting. The extent



Stock of Selected Wood for Hody Hullding, Each islad and Thickness Being Separated, Showing Quantity Required for Ordinary Needs.

of the blacksmithing necessary on a truck body is seldom realized until it is collected for installation. All smith work must be finished that it may be painted and variabled, and this necessarily requires time in addition to the forging.

Next are the metal workers, for bodies may be of wood or combinations of wood and metal, or of metal alone. These men must also have large experience and be qualified to do any job. This applies to all classes of metal from the to all classes of metal from delicate brase sheathing to beavyuplates of steel for bodies for coal and similar haulage. The equipment must be not for one class of construction but for everything that occasion may demand.

In every department the tool equipment must be sufficient to meet with every demand. Naturally every machine cannot be constantly productive, which is another reason for cost.

The upholstery and trimming department must be equally specialized and tise workers must be capable of doing any job to a standard and in keeping with any particular effect sought. In this work the materials are cut to special patterns and these generally differ. This department mass the seats, cushions, backs, lining, tops, curtains, shields, dust-covers, boods, boots, etc., together with work to meet certain ideas not usually applied.

The painting department must be able to handle anything, this ranking from a simple coat of lead to the highext flink that can be applied, for some of the bodies are a given as careful attention as though intended for ornament, and latest of service. The workmen must be broadly experienced. The decorators must be artists, for frequently painting of high class is executed on bodies that must bear close inspection but endure under the server climatic changes. Men of this class command large wages and their work is exceedingly suried. The facilities for work must include dustiess rooms that are well likited and space to handle any reasonable number of jobs.

The supervision of the work is necessarily exacting and requires men of ususual ability, for each job must be given experience men of ususual ability, for each job must be given detailed attention and nothing can be neglected. No contract can be aystematized, and consequently construction must be without regard to the usual methods of manufacturing. From the arrival of the owner of the chassis, or his correspondence, each body constructed is a separate order and as such must be given care in production that would or as such must be given care in production that would or The inspections must be frequent and thorough and each process or single followed by the designer to make certain that the sevelications have been met.

It will also be seen that in designs that are original construction rainon be experimental, and where special service conditions are to be dealt with safety entails a large margin of attracts. This requires a considerable excess of actor, as compared with what might be believed, and material selected for beary work must be of the best to be enduring. With the large builders all metal bodies are frequently ordered and some produced are of steel, this requiring workers who can undertake such construction. It is exceedingip probable that this type of body will eventually be adopted for many whiches, for it indoubtedly has greater en-

Each special body builder must have a stock of material that will met with any requirement. Ordinary lumber will not serve and what is generally used is high class, although the difference may not be apparent in the rough stock. The silis, posts, crossbars, botters and the like must will endure similarly. It is not unamant to use well that



Another Section of the Pointing and Finishing Shop with Pleasure and Service Vehicles in Differing Singes of Completion

costs as high as 25 cents a square foot when purchased, and 15 cents a square foot in the rough is a common price. This is for lumber of an inch or less is thickness. The stock must be carefully selected and some firms have standing orders for certain material with dealers who deliver whatever is available from each tot received. The wood is carefully stored and protected and for each work it is picked to meet the specifications. To maintain a sufficient quantity of well associated human problem of considering and the specification of the specification of the specification of the specification.

Regarded in the light that has been given it appears that there is abundant reason for the cost of special bodies, and that those who have purchased stock animal vehicles cannot base judgment as to prices upon the valuations they have paid for such equipment. It also is apparent that to give the same class of work to their customers the chassis builders would have to maintain draitities of fare proportions.

The accompanying illustrations show some of the departments of the Monsian Vehicle Company, Providence, R. I., which is whiely known as a specialist in motor vehicle body construction. These are working pictures and show conditions as they have been found during one day's activities. It is not to be assumed that it is possible in pictures of this character to give a clear idea of a day's that are necessary, and that the statement that such an enterprise is an industry apart from but allied with the general proposition of motor vehicle building is well founded.

These views do not show the drafting room, the office, or the stock rooms, for it is necessary to carry a consideration of the stock rooms, for its necessary to carry a consideration servers, pins, wagon and carriage parts and fittings, rinsas, servers, pins, wagon and carriage parts and fittings, rinsas, paints, and the stock of the stock o

One of the most important departments is that in which is kept the drawings of every vehicle and vehicle body produced, so that it is possible by records to refer to any specific job and to illustrate the possibilities with any chassis that has been dealt with in the work produced. This series of drawings naturally covers a large number of types, but it does not cover every machine that has been built

Ed. Note—The following articles of this series will take up systematically varying types of bodies and their design with reference to differing service conditions, illustrating them with practical constructions now in use.

NEW DEMOUNTABLE SOLID TIRE.

A new demountable solid tire, the feature of which is that by its use both single and dual equipment can be changed without removing the wheel from the vehicle, has been brought out by the United States Tire Company, New York City. The device should appeal to owners of commercial cars as replacements may be made by any ordinary workman in less than one-half the time required with styles that hereofore prevailed. While there are forms possesses that hereofore prevailed while there are forms possessed to be the first amplicable to both single and dual members.

It meets with all requirements of specifications adopted recently by the Society of Automobile Engineers and will be known as the United States standard demonstable. The demonstable features are possible through making the Inside diameter of the tire hand 3.75 inch greater than the outside diameter of the wheel. For example, that of a 24-inch tire is 30.375 inches; the outside diameter of the standard wheel for a 35-inch tire is 30 inches. This additional size gives a clearance between the tire hand and the wheel band of J.875 inch, all around the circumsference, which clearance makes it impossible for the former to rust or freeze to the latter, as they do not come in contact.

Into this open space wedges are forced which are a part of the flanges, pulling them in and making a good tight joint by the use of boits running through the felloe. These wedges are of a 20-degree angle at the top and flat on the bottom. The top of the wedge comes in contact with a corresponding bevel on the underside of the tire band, forming a search and giving mest to meat contact of about .7.5 inch on both sides of the tire. These wedges are so designed as to remove all strain from the botts.

The action of the weight on the tire is to press the flange wedge directly onto the wheel hand and as it seasts there flat, there is no tendency to spread the flanges. The equipment for a single tire is an outer flange wedge, and inner member and nine, 12 or 15 bolts and nuts, depending upon the diameter. That to follow shows its the same with the exception that it has a centre wedge in addition to the flange members.

All and the search of the sear

The tire tire if is made exactly as the Continental solid form, produced in likemover, Germany, and is built on a steel and with a layer of hard built on the built on a steel and with a layer of hard built on the built of the

Several have been on test cars for some time and one was examined after 5200 miles of service and found to bare worn but 3.75 inch.

LOCOMOBILE ANNOUNCES NEW MODEL.

Among the new vehicles to be shown at the coming display in Madison Square Garden, New York City, will be a five-tion truck produced by the Locomobile Company of America, Birdgeport, Conn. The concern is said to have been working on this model for the past two years and to have incorporated several new features in its design. The have incorporated several new features in its design. The and arroke of six, with four-speed transmission and chain drive. The driver's seat is located over the engine.

Last summer one set there assolines was subjected to a Last summer one tree their trees their was classerabled to not any undue wear. Leaded with 6.3 tons it was driven 900 miles, three test drivers taking turns during the 24 hours continuous service. The subsequent inspection failed to develop any defect.

WHERE COMMER TRUCKS ARE UTILIZED.

During his recent visit to the Kingston, N. Y., plant of Wyckoff, Church & Partridge, inc., New York t'ity, maker of the Commer trucks, il. t'. Underdown, managing director of the Commer plant in England, spoke of the number of these machines in service in the various countries of the world. in addition to the large number being operated in London by various industries, the British war effice has adopted the Commer after trials lasting over two years. The Russian war office owns several of these vehicles, one of which won the gold modal in the official tricks of 1916. in Cajentra, India, the tire brigade has given repeat orders for two years, while orders have been filled in the Argentine Republic, Patagonia, Peru, and other South American countries, also in Russia, the Penang Peninsula, South Africa, Colombo and Ceylon. In Australian centres there are more than 150 of the automobiles in service. Mr. Underdown expressed great satisfaction at the wide distribution of Commer cars in this country through the efforts of Wyckoff, Church & Partridge, inc.



Few people, even those in the automobile trade, have an adequate idea of the number of electric vehicles utilized in the brewery Industry. The General Vehicle Company, Long island City, N. V., has compiled natisfies which have been incorporated in a neat booklet and circulated among the brewers. This company recently passed the \$1,000,000 mark in sales which is a new record for machines delivered to breweries.

According to the booklet, 67 different breweries are using General Vehicle electrics, of which number cight have no less than 196, or an average of 24 trucks each. Over 200 are of the five-ton capacity, besides scores of 3.5 and two-ton trucks. Each five-ton key vehicle has a capacity of 50 full half-barries or 75 to 100 empties, while the 3.3-ton bottle automobiles have a capacity of 91 to cases of two dozen pints each.

It is estimated that the brewerles of the world employ cless than 100,000 horses, which is a fair field for displacement by the mechanically propelled vehicle. It is also pointed out that the machine has 100 per cent. greater duly efficiency than the best horse and that the life of the

and the concern now operates a fleet of 30 with six more ordered.

"According to the superintendent of the hrewery the machines have effected a saving of \$25,000 a year. The number of horses has been cut to 50 and business has increased greatly. Half of the stable, which was 200 by 100 feet, has been remodeded and he being utilized for a been found to be the stable of the st

"The 425,000 is based on a saving of \$533.33 each on 30 trucks as compared with the former horse equipment it cost the convern 33.7 cents a barrel under the horse system and the company maintained its biackenith and harness shop and all other equipment which accompanies such a large installment. After figuring all costs of the automotion of the accompanies are such as a single property of the state of the such as a such a large installment. After figuring all costs of the automotion of the such as a s



Fleet of Baker Electrics Recently Delivered in the Printing Office of the United States Government-The Carrying Capacities Range from 1000 to 5000 Pounds.

former may be made almost perpetual, whereas that of the animal is limited approximately to about four years.

Attention is called by the company to the fact that some of the veteran trucks have been in service over 10 years, and many improvements have been made in models in recent years. By replacing worhout parts as required, and by giving each machine proper care, users may charge off as low as 10 per cent. a year for depreciation, as against 25 per cent. for horses.

The booklet states: "The motor truck did not become a success from the standpoint of either efficiency or economy until makers realized after expensive lessons, that commercial cars must be built on a business car pasis. Sales today are increasing at a rapid rate because the huniness world realizes the passing of the hores and because so many automobiles are making good in their respective fields. They earn money for their owners because they aware it.

"A few years ago a brewery of New York City employed over 120 horses, a large number of heavy wagons and had no automobiles of any kind. In March, 1909, after experimenting with a General Vehicle electric truck the concern ordered a second machine and soon after purchased six more. A year later a repeat order for 18 was given, cents a barrel, an actual saving of 8.95 cents, as compared with the horse drawn equipment. This saving is not claimed where one machine is in service but of 20. In very billy districts, or where the streets are in poor condition, this undoubtedly would be lowered and the expense of horse drawn vehicles also increased. But even if cut in half the the economy effected would still be nearly five cents a harrel."

The transportation of printed matter, the product of the printing office of the United States government at Washington, D. C., is by commercial automobiles and in the accompanying Unistration is shown a fleet of electrics recently delivered by the Baker Motor Vehicle Company, Cieveland, O. These machines consist of two delivery wagons, two light, and a like number of heavy trucks, with a carrylog capacity ranging from 1900 to 5090 pounds.

The smallest machine is propelled by a motor, which is series wound, bung on a tubular bar across the frame in front of the rear site, and current is furnished by a 42-cell Exide battery of 84 volts and 24 amperes. A continuous torque type of controller affords five speeds forward and three reverse. Final drive is by double side

chain and one set of expanding brakes is fitted and these act on the rear wheels, which are 34 by three inches fitted with solld tires. The atcering wheel is at the left. Semi-ciliptic aprings are employed both front and rear.

The one-ion vehicle is equipped with an 84-volt 28-ampere battery, and has a wheelbase of 92 Inches, and 34-3.5-inch irrs. The larger automobile has an 84-volt, 42ampere battery with a 120-inch wheelbase, and 36 by 2inch solid irrs are employed. The other chassis details of these cars are the same as those of the smaller vehicle.

The Kentucky Wagon Manufacturing Company, successor to the Electric Vehicle Company of Louisville, Ky, is constructing and marketing a large number of 600 and louo-pound cajacity electric delivery wagons and in the Illustration herewith is presented one of the former type. It is propelled by a So-cell lead battery and the inlustration for the company of 12 to 15 miles for the control of 10 to 15 miles for 10 to 15 miles f

A remarkable mileage on one charge of electricity is credited to a Fritchle automobile which correct 110.5 miles recently. The car carried four persons and was whole distance. It was operated by M. Francis Eagan of Flatbush Long Island, N. Y., who started the machine at Prospect Park, and the courts was on the botheward to the occur from and read to the occur from and remines.

The lattery is a 32-cell Pritche and the machine is acade by the Pritche Automobile & Pritche Read Pritche Automobile & Hattery Company of Denor-College and the Arkine switch controller is utilized providing the species forward and three reverse, and the drive is optional, being either shaft optional, being either shaft optional being either shaft optional heing the product of chain. The motor is compound, hanging from the body, and the maximum speed is rated at 22 miles an hour.

That the electric vehicle is described of long-vity and of rendering efficient service is demonstrated by a report of the General City, N. Y., which states that one of its machines has been in continuous service with the American Tool Company of Hoston since

January, 1966. During the first two months the vehicle met with an accident strictly outside of the running of the automobile, which laid it up two days. It was again placed in commission and has been doing its full quots of work every working day since, automer and wister, covering a period of over the years during which and painted and again placed in service. This is a remarkable record for a commercial vehicle.

A striking example of the efficiency of the electric motor as utilized in pleasure and commercial vehicles is noted at the factory of the Waverley Company, indiampolis, Ind., where one is employed to drive an oil pump which forces implicant through different machines into a fitter and back again. The motor was discovered in the Junk pill of the control of the cont

been stopped for repairs. The only attention it receives is offing once a week.

The practicability of the electrically propelled fire apparatus has been exemplified by an aerial ruck which has been in service at Springfield, Mass., for a period extending over a year during which time but \$3 has been spent for repairs, these consisting of a broken battery jar. The apparatus was inspected recently by an expert from New York chies was first purchased, and who pronounced it in excellent conditions.

An electric motor passenger service between Springfield and Boston, Mass, is being discussed and it is thought that during the summer months it would appeal to those traveling between the ciries. The practicability of the plan is based upon the recent performance of two electric automobiles on a trip between New York (Ity and Boston. The machines started from Boston and reached Worcester, a distance of 44 miles, in 1:53 you. The road between Worcester.



Tool Company of Hoston since Electric Delivery Wagon of 600 Pounds Capacity Hollt by the Kentucky Wagon Mannfacturing Company.

ter and Springfield is 34 miles with many long hills, but the electrics maintained an average speed of 21.2 miles an hour. After recharging, the whelces ran to New Haven, Conn., a distance of \$2 miles in \$3:12:00, and were again recharged. The next day the automobiles ran to New York City, completing 244.8 miles in 12:24:00 actual running time and at an average of 20 miles an hour.

The Baker Motor Vehicle Company, Cleveland, O., is lesuing a series of loose leaf binders giving valuable information upon the application of the electric vehicle in various commercial fields. A recent issue contained the following paragraph: "In investigating the actual cost of draft animal transportation, palms abouth be taken to ascertain
that the accounts produced really represent the necessary
expense of service, and have not been paided by accident, the
drift of tradition, or by arbitrary dissections for the
convenience or economy of the auditor. A mistake would be
unduly exaggerating the advantages of the machine over
the borse draw equipment.

PIERCE-ARROW TRUCK ADAPTED TO FARM SERVICE.

THE utility of the power wagon in agriculture has been exploited very much in theory and it has been held that its value to the farmer is its superior speed and carrying capacity, best to be employed in the transportation of

of years. In other words, the truck ought to have a life by mileage and this might be made in a comparatively short time or extended over a number of years.

A very interesting experience is that of Alfred G. Lewis,

whose estate, the White Springs Farm, is near Geneva, N. Y., and Mrs. George II. Lewis, whose Bellwood Farm adjoins that of Mr. Lewis. The former property is of 700 acres and the latter 350 acres. and while they are cultivated separately the owners have joint ownership of a Pierce-Arrow worm drive five-ton truck. The farms are well managed and a considerable part of either is cultivated, though sheep and cattle are largely raised and dairy products form a material share of the total. The farms are conducted to systom and this requires a record of work and results as well as financial transactions. In the use of the truck it is necessary to divide its work and the cost of operation, malutenance, upkeep, repair and other expense is similarly apportioned, the tonnage being represented by a ledger account. It is not practical to have the machine do equal work for either owner and this results in a tonnage



ist and it was the experience with a pleasure motor car that led to the adoption of the The farms have horse equipment and last summer when harvesting peaa from an 80-acre tract it required ali the horses available to haul the vines from the field to where the peas were shelled for delivery to a canning factory at Geneva. The peas are sold shelled and after shelling it is necessary to deliver them as quickly as possible at the cannery. The custom at this farm is to carry the peas in baskets which when filled weigh 60 pounds. The need of harvesting desends upon the maturity of the seas and once



Plerce-Arrow 66 Horsepower Touring Car Lillined for Emergency Service on Furms Near

crops to market or place of shipment, and in conveying supplies. This theory is not to be denied and while this advantage as compared with animal wagons and carts is a aufficient justification for purchasing, it has been found by practical experience that a truck can be utilized for many purposes for which horses have been regarded as having their greatest usefulness.

It is not visionary to assume that in a comparatively brief time much of the cuitivation of crops of large proportions will be by motor driven machinery. It is not seemingly practicable, however, to have diversified harvests and have apecial equipment for each that will require the investment of material capital. The special value of the horse In farming has been its adaptability to service where speclai ways do not exist, particularly in rough ground, although it has been realized that such work must necessarily be more expensive than were it haulage on roads.

The power wagon as now developed is of such construction and its power is so well utilized that it will serve any transportation purpose for which animals can be used, with entire certainty and much less expense. One of the qualities that ought to commend a motor wagon is that it has practleally no expense attached to it when not in use aside from the insurance and the interest on the investment, a very large saving when it is understood form horses are not used a considerable part of the time and rapidly ent the profits made by them while working. Were it possible to find service for the horses for all the time farming would unquestionably be more productive, yet no farmer can bire animals as he does labor, increasing or lessening his facilities at will and with a view of economizing.

It is necessary to invest capital in horses and in this respect the condition is paralleled when a power wagon is acquired, but the reduction of the expense of the unproductive period is so pronounced that there is a distinct saving even when the service appears to be comparatively small, not considering the large reserve of continued operation, for in farming service appearance is not so important a factor as in urban haulage, and theoretically and practically the vehicle ought to be useful for a considerable number



Londing Pierce-trrow Truck with Cabbages at the White Spring Parm

the work is begun it must be hastened. Delivery after shelling is even more imperative than harvesting

The lack of horses impelled Mr. Lewis to adapt his 66 horsepower Pierce-Arrow touring car for temporary work, which was done by removing the body and installing a rack in which could be packed 52 baskets of peas. For 15 days the touring car was utilized to carry the crop to the cannery and when the service was accounted it was found dition to this the truck has been used in plowing with extremely antisfactory results, hauling harrows over plowed land, for filling siles and cutting corn stalks as well as hauling fertilizers about the farms. The work has been wide-

ly varied and in every respect the machine has been equal to expec-

in considering the work it is held that the truck has been equal to at least three teams of two horses for whatever purposes it has been used, has hauled freight faster and saved time when time was valuable, and has made it possible to do the farm work better and more easily. On the road between the farm and Geneva the truck has been equal to five teams of two horses and an equal number of wagons, the driver and his helper doing the work of five men. Taking the average on and off the farm Mr. Lewis estimates that the truck is more than equal in its service to three two-horse teams. in comment concerning the truck and its work, Mr. Lewis states that on these farms the truck has certainly come to stay. His conclusions, after practical experience with animais and power wagons. are worthy of careful considera-

rip from Farm to Market.

His farm is conducted and managed as is any successful enterprise. He has decided that it good business judgment to utilize the truck for it bermits of savings through evonour.



Five-Ton Pierce-Arrow Truck Loaded with Cabbages Ready for Trip from Farm to Market.

6 mm

that the cost of haulage was decidedly reduced as compared with the use of animals. So satisfactory was the result that after consideration of the possibilities for use on the farms the five-ion truck was ordered.

The truck was delivered to the farm Sept. 1 and since that time it has been in active service with a satisfaction that has been broadened as experience has been gained. In using the machine a driver was assigned who had no knowledge of driving and it was necessary to teach him to handle it. This condition gave less actual productiveness than has for the truck was not loaded to capacity until the driver was thoroughly competent.

The truck was not delivered until practically the end of the farming season which is from April to September While all the possibilities with the machine have not been developed what has been accomplished has demonstrate that there are many uses not believed practical for power vehicles where its worth has been established.

During the three months ending Dec. 1 the truck hashed, 1,316,829 pounds of freight, or 5.58 + tons with a milester of 15.38. The fuel burned was 37.6 gallons of gasoline and the cost for this was \$4.51.2. The oil and grease used and \$6. The actual expense for operation of the machine during the period was as follows:

thriver and pay of men	hamiling freight	8.
Claseline		
Oil and grease		
Depreciation at 2% .		
lo-arance		
Interest at \$5		

The average has been four miles for each gallon of anothie consumed. The favored do not indicate the netual cost for work now performed as the expense indicated has been considerably decreased. While the depreciation is not figured high the reason is that its service is regarded as nulleage, which it is expected to realize with intelligent as

The service required of the truck is especially varied and it would appear that its uses were collectively of unsual interest. The loads have included innber, brick, cement, and and gravel, cherries, applies, cabbages, notices, wheat, cord wood, coal, halfed siavalings, hay, straw, feed, milk, and sheep and cattle, in general work between the farms and the city, and about the adjacent section. In adof time, a source of profit that is always productive.

A 10-ton automobile recently has been placed in service
by the Boston & Maine railroad for use of the engineering
corps. The car is making a trip over the lines of the company on a regular train schedule, the drives signing to



Pierce-Array Truck Starting from the Farm for Geneva, N. Y., with Load of Produce.

train sheet the same as conductors. Many of do se cars are in use on the western railroads, where they have demonstrated their ability to make long, quick runs at small

GENERAL ELECTRIC BATTERY TRUCK CRANE.

In THIS age of enterprise distance has been annihilated and the products of the soil and of the industrial plants and economics it is not seen and economics it is a seen and economics it is a seen and economics it is incorrectly in the product of the seen and economics it is incorrectly in the seen and economics and economics at a seed and economics and economics and any point. The large quantities of freight that pass through the central distributing and shipping points can be handled so as to eliminate delay only through the utilization of very efficient devices. Marvellous reductions in the time commended during the past few years, through the use of the belt conveyer, elevator, grash bucket, ore bridge, and

In the matter of package freight, the motor truck has demonstrated great superiority over the horse drawn vehicle. Where a fleet of commercial motor wagons is maintained to transport neary packages to storchouses, shipping points, or other places, expedition in loading and unloading becomes imperative. Various methods for accomplishing the heatery truck crans. This support three notable advantages, in that it always is set up ready for instant use, can ordinary intelligence can become fairly proficient in its operation in a day and expert in a few weeks.

Where the material to be loaded is in parcels of one ton or less and is in a pile where the truck can be brought alongside, the battery crane is placed in an advantageous position, the brakes set, and the vehicle remains sattlenary as the boom moves back and forth between the picking up and depositing points. Some idea of the rapidity with which this destee works may be gained from the following performances:

Three hundred castings aggregating \$5,000 pounds were unloaded from a gondois car in five hours, giving an average of 1.2 lifts a minute. A box car was loaded with \$4 800-pound barrels of plumbago in 23 minutes and four cars in 2.5 hours, the latter work including spotting the cars. This averages two barrels a minute hoisted hearly five feet and awung well inside the car.

The short wheelthase permits short turns, so this machine readily may be driven about shop aisles, congested piers, among piles of material in the storage yard, and may even be carried up elevators to get goods which are to be loaded on motor trucks. By this pick-up-and-run meth-



General Electric Company's Butlery Truck Crane Landing Truck with Material Collected from Agricas Points.

move quickly from place to place, and carries its power plant with it as a permanent part of its equipment.

An accompanying illustration presents the crane recentive brought out by the General Electric Company, Schenectady, N. Y. This device is an electric vehicle which has acrane arranged to swing in an arc of 180 degrees mounted on the front end. The hook is raised and lowered by a one-ton hoist, located immediately helind the crane, and the motors driving this and the vehicle are operated from a storage hattery, as situated at the rear end as to act as a counterweight. Special attachments are fitted to suit the character of the work contemplated, these consisting of rope and chain silings, barrel tongs, bale grappies, box hooks, smatch blocks, small tools, etc.

The electric holst comprises a compact weather proof motor, a controller, gears, and a drum combined in a unit, capable of lifting one ton, 20 feet a minute. The holst controller handle is connected to a lever convenient to operator, who pulls to raise, pushes to lower, and lets go to stop the load at any point, the lever going to the "off" position in the latter instance and holding brakes automatically locking the drum. A load brake also is provided to prevent the operating mechanism is held to eliminate the need for technically trained men, it being calimed that a man of

od, in which the material is carried on the hook, 50 800pound barrels of plumbage were moved 300 feet in one hour, only one helper heing required. One hundred and fifty 300-pound boxes of ruther were conveyed 75 feet and loaded into a box car in 50 minutes, three boxes heing slung together and a round trip made every minute.

The crane can be coupled to traiters and accompany the feet of trucks for the purpose of unloading them when the material is being conveyed to some central point. It also serves as a general utility vehicle, quickly replacing spilled loads, pulling the trucks out of the mud, and transferring packages from disabled apparatus where delays would occur otherwise.

FEDERAL TRUCK USES GOODYEARS.

The Pederal motor truck, made by the Pederal Motor Truck Company, Detroit, which won the cup in the recent Chicago-Detroit reliability content and has been demonstrating in that vleinity since, with the exception of the time it was employed as a baggase car on the Glidden tour, is should with Goodyear tires, made by the Goodyear Tire & and with Goodyear tires, made by the Goodyear Tire & the control of the Company of the Company of the Company countered on its southern trip, the vehicle went through without the loss of a moment's time through thry tropide.

SIX YEARS IN DEPARTMENT STORE SERVICE.

Figures Presented by British Installation of 56 Motor Vans Indicates Enormous Saving Over Utilization of Horses with Increased Business Development of 100 Per Cent.

By C. A. French.

WHILE many department stores in the larger cities of this country have installed extensive fewer of mechanical transports, it is rare indeed that any is found which has been in service for a perfood of several years. For this reason, it undoubtedly will prove of interest to consider the work performed by a foreign installation, which covers a little more than six years. The figures presented herewith were compiled by Leyeuser larwell, one of the partners in the firm of Shootbred & Co., London, Eng., which began replacing its horse equipment with Larger trues, made by the Lacre Motor Car Company, Ltd., Letchworth, Kng., in October, 1985.

in order to become familiar with the construction of these cars it will be necessary to consider their details, information for which has been furnished by one of the officials of the lacre Motor Car Company. He writes as follows:

"Our chassis comprise a range of models having a net carrying capacity of 10 cwis, to five tons, 12 to 50 horsefective parts are being remedied. For example: The enemies it ire motor unit mounted on a sub-frame can be detached it from the main frame easily and quickly, and a complete sparre engine abustitured, so that the necessary work maps be accomplished without keeping the vehicle off the roaden's keeping as stock, one complete sparre unit, and thus over-hauls time. For affect of cars appreciable time. For oning on at the time most convenient to the user, without interfering in any way with the service.

"We ourselves have designed our engines throughout, and they have cylinders can in pairs. The 12 horsepower two-cylinder and the 30 horsepower four-cylinder have a bore of 4.32 lanches and stroke of five finches. The 18 and 23 horsepower motors have hore of 4.875 and stroke of five inches. Revolutions are limited to a maximum hy a heavy type centrifugal governor situated in the crankrase. The lower portion of this case is merely a sump for oil, and



Shoothred & Cu., London, England, Bave Been Operating a Flert of These Lacre Vehicles for fiver his Years with Spiendid

power, and two and four-cylinder motors, it is well to the remember in this connection that an English ext. is 1125 pounds.) In their design simplicity has been studied especially with a tive to the vehicles being handled by unskilled drivers. No startling innovations have been emended out. With our special experience and facilities the product of the property of the property of the product of

"We claim that we have embodied all that is best in the designs of other manifecturers, combined with features which are unique. The large number of repeat orders with which we have been favored, we think is sufficient proof our machines are considered most desirable by those best fitted to ludge.

"We have made a very apecial feature of the case of repair, recognizing that a great deal of time is lost in overhauling vehicles, when by methods such as we have adopted, one unit which requires repair may be aubstituted by another, and the cars can thus be kept on the road while decontains a patent oil pump, the whole being removable without disturbing the main bearing of the engine, and this latter may be attended to without removing the motor from the chassis if deemed advisable.

"The lubrication is forced to the main engine bearings and connecting roo big ends, and a simple and effective teit-take fitted on the dashboard shows that the lubricator is take fitted on the dashboard shows that the lubricator is performing list work satisfactority. The patent oil pump is valveless and barring breakage, it is impossible for it to requires no adjustment of any kind. The crankshaft is of requires no adjustment of any kind. The crankshaft is of special high grade steel, and the cambalts and wristpins are case hardened; the cambalats and cams are cut from the solid.

"The injet and exhaust valves are located on opposite sides of the engine and are mechanically operated. They are interchangeable in all sizes. The valves are made of nickel sized and are of specially large dimensions

"The ignition which we have adopted is fixed itosch high-tension magneto. An advance can be arranged for it if required, but we do not recommend it: "rovision is made



Platform Type Uncre Truck, Large Orders for Which Have Been. Filled in Australia.

on the engine for fitting a duplicate magneto, this comprising magneto, cables, plugs, etc. We particularly remove mend this for export purposes. We can fit, if desired, a high-tension coll, storage butteries and plugs as an alterial tive, or additional, to the spare magneto, but we recommend the fitting of the latter.

"Cooling of the engine is effected by a large centrifugal pump driven direct, and a radiator of large capacity. The water is circulated through vertical gilled tubes, and the fan situated behind the radiator is belt driven; the tension of the fan bett is adjusted easily.

"The simple clutch is leather faced, conical, engaging with the flywheel. The drive to the genthox is transmitted through a special form of enclosed spring drive, which is particularly efficient. The genthox is provided with four speeds forward and reverse in the tirree, four and five-don sizes; (three speeds forward and reverse in the lighter vedicles. All speeds engage by means of due clutches, except the first and reverse. The change speed mechanism is of

"Final transmission from the gearbox is through the differential gear contained in the box which is a part of the same casting, and thence by cross

shafts and side chains to the rear hubs. The differential mechanism on all models includes two crown wheels. This is an expensive fea-

"Special attention has been given to the efficiency of the hrakes, those worked by foot operating on a single drum fitted on the substantial extension of the differential shaft, and those by hand being internal expanding forms operating on the rear hubs. The shoes have detaclable cast in the constant of the constant

"All chassis are constructed with a particularly large wheel lock. This is a very special feature of our vehicles, and they can be turned in a remarkably small circle. All models are well protected from mud by a metal ahield suspended under the chassis and readily detachable." with a variety of bodies, as indicated in a new course by the libratations herewith. An order for 10 five-ton platform true is, similar to that shown, followed a single risk in Sydney, Australia, and four of the 20 horse-power two-integed shired swapins have been shirped to the langkok Corporation In Sian. Numerous repeat orders are recorded both a home and abroad

The Lacre chassis are fitted

The Shoolbred Installation in now one of the largest fleets of motor transports operated by a motor transports operated by a host of the largest fleet in the knowledge of commercial motor traction gained from it undoubtedly is the best that can be obtained. Two cars were purchased in 1905 and the present equipment totals 36, all of the large make. Short of those age of eight purchased this year were of the 18 horsegower 25-ew, type,

In a letter to the writer, Mr. Harwell says:

"We have 56 motor van on the road at present, all
supplied by the Lacre Motor Car Company. The first two
were put on the road Oct. 2 and 9, 1905, and have done
more than six years' work. We estimate that each of these
two vans has covered 100,000 miles on the road. From
their present condition, they should run at least another
30,000 miles, and we may could on all teo depth years a
scrap the old models, they will be replaced by latest type
Lacres from the Letchworth factory.

"By the aid of mileage recorders we find that each van runs about 18,000 miles a year, making an average of 63 miles a day on the road. Some vans do much less, but many do more, a few rounds running into 25,000 miles a year. Our longest regular service is to ilindhead and Hastemere three days a week. This route averages 120 miles a day.

"It is interesting to see how such a service as this grows. We started by delivering a vanload to a certain house some miles south of Hasiemere, whenever the order was large enough to enable us to do it by road. We then



Collapsible Top Vehicle Produced by Lacre Motor Car Company, Sold in Increasing Numbers,

arranged a monthly service to this one house. Ity degrees a few others came to know this, and the service became fortnightly, then weekly, nutfl finding that the weekly service often meant sending two vans on one day, we made it three days a week as at present. In the same way our service to Hitchin, Ieteltworth, Italdock, etc., began mouthity, and also is now three days a week.

"Before we started motor vans we had 300 horses in our stables, and at present we have 120, mostly for heavy work. Each van does the work of at least six horses on an average, and many rounds would take quite eight blorses; that is, supposing it were possible to use animals at all. This cannot be done, however, as vants do not start until fresh supplies are in from Covent Garden Market, and the fish market, and the day would not be long enough to deliver fresh runt, vegetables, fish, etc., in time to be of use. By means of these 50 vans, we have doubled our road milescent for the started with horses. On the supposition that all our present routes could be exceed with horses and give satisfaction, we estimate that we would require from 500 to 00 horses in our stables.

"But if we had 300 horses six years ago and now do the work of from 500 to 600, and in the meantime have doubled our road mileage a year, what about the extra expense? Taking the average of the last six years we have

IN.	Value,	heat year	interests continued	\$11.7.12
11	V459,	second year.		
11	Vittor,	Hilled year .		213 12
241	3 (611)	fourth year		251 117
P _p	vans,	fifth year		262.50

Average Cost of Reputes.

15.1	Same, first Year.	4112.53
61 1	vans, second bear.	241.09
31 1	vans, turnd year	235 % 1
201 1	varios, fond the year	264.51
6. 1	Comm. bifth Year	200.77

This gives an average expense of \$211.07 for tires and \$243.36 for repairs on each vehicle. Mr. Barwell disregards the first year's costs as leng too favorable, bringing his average to \$47 a year for tires and \$53 for repairs. His table of costs follows:

Depreciation, 12.51				\$217.72
Reportes				257 92
Tires				224.73
Fuel, 1645 gallone % 14.2 cents				27139
Driver n \$7.53 a week				292.24
Oth, grease, carbide, etc				34.16
Washing				25 24
insurance, third party only				26.28
Total				\$1415.34



One of the Four Two-Ton Hinge Sided Trucks Receotly Shipped by the Lucre Motor Car Company to the Hangkok Corporation to Siam.

increased our stable expense \$400 (\$1948.60) a year, and to offset that we have increased our road mileage no less than 100 per cent.

"In the six years, besides extending all our existing country rounds, we have added 20 districts by the use of 12 additional vans; four vans do a district daily, and eight do one district three days a week and another the other three days. These 12 vans mean 12 drivers at 30s 187,30; a week and 12 porters (helpers) at 20s 187,30; a week and 12 porters (helpers) at 20s 187,32; a mercaused wages of £1740 183455,40; a year. But as motor vans are so much cheaper to run, the total expenses only average £405 181968,36) a year more. Had we put on 12 additional horse vans, each worked by four horses, the expense must have been increased £5400 (£28,300) a year, including the wages of 12 porters.

"Our rountry rounds, when done with horses, averaged at miles a day, and each round took four horses to work two working and two resting. Allowing 18 days off in the year for relating to van and absence of horses from lameness, colds, etc., not to mention their deaths, such a round would total about 13,000 miles a year, and at the lowest would cost 2550 (\$1701) to work. This is at the rate of 5.5d 13 cents a mile. From the accompanying factures it will be a transfer of the control of 18,000 miles a year cost fatter than the control of 18,000 miles a year cost fatter than the control of 18,000 miles a year cost fatter than the control of 18,000 miles a year cost fatter than the control of 18,000 miles and the cost fatter than the cost of the

Mr. Barwell's figures have been converted into American money for the better understanding by the reader, and cover one jear's service.

He adds: "I have not allowed for interest on capital or agarage reni, but I have not taken either liter in my borses agarage reni, but I have not taken either liter in my borses. All our buildings being freebold, it is difficult to estimate the rest. If the literest come out more for motor vans, the rent certainly sound be lower, as one motor van requires much less room than one van and serve motor vans established for motor vans. Singineer's statele are charged in 'repairs for monors was and was responsible for the stable for the stable for the vans's for monors and the vans's for monors and the vans's for monors and vans's for vans's and in the figure of the new tocomotion, and not one for the new tocomotion, and not one for the new tocomotion, and not not prevent the motors.

"We have done the whole of our reputs for 4.5 years, and the only men engaged on account of the new traction were mechanics in the repulr shop. Not one single man has been engaged as notor officer, and our engineer and his assistant have been with us for several years in our electrical engineering department. Of the had two it is diministrated in the control of the single strength of the several years in our electrical engineering department. Of the had two it is diministrated in me, or specific particular of the surface of the several years in our electrical engineering department. Of the had control of the particular than the several years in the particular than the several years and the several years in the particular than the partic

To return to Mr. Barwell's figures. His degree atting would indicate that each truck costs practically \$2000. The

item of repairs undoubtedly is governed somewhat by the cost of labor, which is decidedly different from in America. as evidenced by the wages paid driver and belper. Just how this same ratio is maintained with respect to mechanles is a point that is not made clear in Mr. Barwell's letter. Tires were solid, and the price probably does not differ greatly from those in use here, judging from the cost of the truck.

Gasotine is measured in England by the imperial gallon, which is equal to 1,20032 gailons in America. means that the average fuel consumution was 1270 gailons, which could be bought in this country for at least 10 cents, making the cost \$127, as against \$233,59. The charge for oll, etc., appears to be about the same as would be the case in America.

Mr. Barwell explains that all the company's buildings are "freehold," which means that they are owned outright by the firm, instead of being leased for a term of 999 years as is quite common in that country. Even under similar circumstances it would be customary to charge something for rent in America.

The chief value in Mr. Barwell's figures lies in the statement that the added stable expense has been but \$1950 to to secure an increase in business of 100 per cent., while it would have taken an increase of some \$19,800, disregarding the wages of the 12 helpers, which were needed in either form in the rear. Solid tires are fitted to the wheels, the front members being 36 by five inches and the rear 36 by 3.5, dual. The wheelbase is 13 feet, two inches and tread 68 inches. The approximate weight is 6800 pounds.

DELIVER WHEELS BY VELIE TRUCK.

Franch & Hecht, Davenport, la., maker of steel wheels, has purchased a three-ton Velle truck, made by the Velle Motor Vehicle Company, Moline, Ill. The car is to be tried out on the delivery routes for which between 15 and 25 horses are now employed. If the plan works out as expected all the horse drawn equipment will be replaced with Velle trucks.

LONG PLEASURE TRIP IN REO TRUCK.

Mr. and Mrs. Ralph Barker of Empire, Ore., recently completed a most novel transcontinental trip, utilizing a Reo light delivery wagon, made by the Reo Motor Car Company, Lansing, Mich. The journey occupied 43 days, and when the truck arrived at its new home in Oregon it anparently was in as good condition as when it left Stratham.

N. H., where it was purchased. A few months ago Mr. and Mrs. Barker left their homestead in Empire on a visit to their

native town in New England. While there, they purchased the automobile, and decided to return over the road. A touring cover was attached to the vehicle, converting the interior into a regular living room, and the further equipment included a complete camping

The idea was to provide as much enjoyment as could be gained in a tour of this nature, and Mrs. Barker has informed R. M. Owen & Co., New York City, distributor for iteo cars and trucks, that the trip was one continuous round of pleasure. The route included Chicago, Council Bluffs, Omaha, Cheyenne, Holse, to Burns, Orc., thence over the Princyille-Santiani route through the Williamette vailey to Roseburg and across the Coast range to Empire.

The total distance was not far from 7000 miles. Aithough much rain and muddy roads were encountered in Nebraska, Wyoming,

Idaho and Oregon, the party reached home nearly two weeks earlier than it had expected. Not a cent was paid for railroad fare, the entire journey being made in the motor truck,



Mack Enclosed Passenger Omnibus Providing Seating Capacity for 18 Persons. case, to have accomplished the same result with horses, granting it would have been possible to do the work with animals.

MACK ENCLOSED PASSENGER 'BUS.

Motor propelled omnibuses have been in service abroad for several years and they are now being introduced in this country. Chicago has taken up this form of service which example is being followed by Indianapolis, Ind., and in the accompanying Illustration is shown a type of vehicle adapted to this kind of work. The machine is made by the Mack Bros. Motor Car Company, Allentown, Penn., a constituent of the International Motor Company, New York City,

Entrance to the automobile is at the front and the body dimensions with the overhang provide seating capacity for 18 persons. Energy is furnished by a four-cycle, four-cylinder, water-cooled motor of four-inch bore and five-inch stroke, rated at 48 horsepower. Dual ignition is provided and lubrication is by a mechanical force feed oiler, also a splash system in the crankcase. A friction clutch of the cone type transmits power through the gearset which is the selective individual clutch method, to the countershaft and thence to the rear wheels by side chains.

Semi-elliptic springs are utilized in front and full plat-

GARFORDS IN TWENTY CAR LOTS.

That the husiness world is beginning to realize the many possibilities of the commercial vehicle in transportation service, appears to be borne out by numerous recent sales of cars in large lots. The R & L Company, New York City, reports a contract with James Butler, a grocer who operates a chain of stores in the metropolis, for 20 one-ton Garford cars, made by the Garford Company, Elyrla, O.

WATERBURY HAS CORBIN AMBULANCE.

The Waterbury Hospital in Wateroury, Conn., has purchased a motor ambulance made by the Corbin Motor Vehicle Cornoration, New Britain, Conn., and thus becomes one of the few hospitals in that state to be thus equipped. The new machine will have two compartments so that several nationts may be carried at the same time.

HAULING AND DISTRIBUTING ICE BY POWER WAGON.

Economy and Reserve Facilities Experienced with Truck and Delivery Supplementing Animal Service Under Conditions Extremely Variable—Results Decidedly Satisfactory in Outside Work—Great Saving When Vehicles Are Not Active.

By William W. Scott,

THE haulage and distribution of ice, either by animal or motor power, is varied greatly by changes of temperature and by season. Obviously at two perhads of the year there are large and exacting demands for the use of animals. With power wagons the winter requirements do not parallel those made upon horses for it is not possible to utilize them in the harvesting of ice.

In considering this subject with reference to mechanical transports it is well to understand the conditions obtaining that the economic possibilities may be made clear. There is a certain constant volume of the business of an ice dealer, that is, so far as service is required, but this is varied by belght during the summer, and then there is gradual dimination of volume until it is lowest with the coldect remperatures. Ice is a perishable commodity. It is estimated that the shrinkage, a loss horne entirely by the deoler, from time of cutting to delivery, will average 50 per cent. Of this approximately 33 per cent. is in the tee house and the remainder is breakage and meltage. When exposed to the air the loss is very rapid and the warmer the atmosphere the greater the shrinkage. Rapidity in handling is a decledel economy but the character of the loads have necessitated heavy carts and the slowest of haulage. Loading and unloading cannot be greatly expedited, and as there is



Peerless Truck of Faar Tana Capacity in the Service of the Pocasael Ice Company, Providence, R. I., Equipped with Special Rada.

the weather. There is another proportion that demands attention for periods differing in length, beginning with late winter or early spring and continuing until well into the autumn or early winter.

The ice is harvested as quickly as is possible, aithough the actual work may be at intervals more or less frequent for several months. In preparation for ice harvesting there is preliminary work done at convenience. Occasionally it is necessary to transport equipment or supplies from the one locality or another, when expedition may be of extreme importance. In the actual cutting of ice the plows are drawn by horses for which work the power wagon cannot be used, though it might be made a substitute for animals used for hoisting. Quite frequently the places of harvesting are long distance, apart and if conditions necessitate the work being done simultaneously the total number of animals required might for a brief time be practically all that are owned by the ice cutter. As quick action is advisable when a harvest is begun a dealer must have facilities that are at his command when needed. For harvesting some horses must be used unless means are materially changed.

The distribution continued through the winter months is increased as the weather becomes warmer until it is at its

but little difference in speed of draft animals when hauling loaded or empty carts endeavor has been toward minimizing the service of the delivery wagons by carrying to them whatever replenishments were necessary, so that delivery may be made with the least actual loss of time by the drivers and helpers. This applies to the usual house to house delivery, or retail trade.

The wholesale delivery is in quantities from several cakes to several cakes to several tons, and obviously the number of rails for a team is much smaller. The hauling is not as long as a rule said the direct loss by shrinkage is less than with the the family service. Often in some localities the available lee aupuly is exhausted and this necessities buying to or shipping it from another place. The ice is hauded in cars and it must necessarily be handled quarky to minimize shrinkage. Generally ice so received would be derivered from the car.

It will be seen that the distribution of lice may require many atops (does together; taking much time to cover a short distance), frequent stops in different sections of a commanity, stops at varying distances apart, or, with coversion of a commanity, and the stops of the commanity of the wisclease branch, delivery by the load or in quantities requiring a few calls, such distribution generally being sections. tered. Of course it is impossible to concentrate delivery, but it is often necessary to confine it to sections where the number of customers make it profitable to call.

With rare exceptions all ice dealers of importance believe it necessary to maintain an equipment sufficiently large to meet with the greatest demand upon them. To insure continuance of custom it is desirable to sever all reasonable demands, and excess justronage must be cared for acparticularly when extremely warm weather will double, triple and sometimes quadruple the delivery service. When other business men feel that it is necessary to reduce the work of their animals the ice dealers often are required to work theirs beyond normal requirements, even at the risk of incapacitating or perhaps permanently reducing their results. There is a limit to the work of the men as

The experience of the Pocasset Ice Company, Providence, R. I., the past season with power wagons supplementing Ita animal service has established the efficiency of the former for a certain work. This is resulting from the use of a Peerless four-ton truck and a Reo 1300-pound wagon. It is not to he assumed that this experiment was undertaken without uncertainty as to results. The extreme heat demanded a service beyond the resources of the concern, and a couple of demonstrated when the the concern, and a couple of demonstrated when under the use of the demonstrated wagon until the



Peerless Truck in Contract Outside Service, Piled High with Handled Laths,

machine ordered had arrived. A demonstration was made for two days with the Peerless truck, which was purchased upon condition of immediate delivery, aithough this deprived the agency of the only truck it had, and it has since been without a demonstrator.

Most large ice companies have central supply stations where ice is received from outside sources, from which the distribution is made by carts which renew supplies at this point. From these stations supplies are also sent to smaller stations in different sections where other series of carts are loaded, this saving the time of the drivers, animals and produced the station of the section of the series of the series of the section of the series of the series of the section of the series of the series

Where a supply wagon is used the driver will go to the vicinity where he ought to meet a peddling cart and bust until its driver is found. Then the peddling cart is driven to the aupply wagon and the ice transferred. The process is repeated until the supply wagon is empiried, when it returns for a fresh load. Naturally in such service saving the drivers and the abrinkage of the ice, which is an important factor, for all loss must be borne by the dealer.

In the rapidity of supply service there is decided economy. The loaded carts are sent out as early as delivery

can be begun, this varying with reference to family or business trade. According to conditions one, two or even three men may attend each cart. With the wholesale trade at least two men work on a cart because of the labor necessitated in handling the cakes. The carts having regular route work are drawn by a pair of horses and start with loads of about 8000 periods each. The daily travel is about an autority of the cakes the categories of the categories and start with categories are called the categories of the categories are supported as autority and the categories are categories.

The family delivery is usually solicited by the drivers. In the winter one route may be a combination of the customers renaining from several summer routes, but in the spring the drivers call in of normer customers and by distributing cards and others means of advertising develop hosiness. The delivery is extined on for as each man can be delivery is extined on the seach man can be delivery in the delivery of the delivery is delivery of the d

Where the customers are close together the horses become trained and some will work with much intelligence, a stopping at customers' houses and starting with the sound of a gate closing or the drivers' steps, so that unless there is is 100 yards or more to drive the animals often follow along at or without command. In work of this character, where it would be necessary to stop and start a motor to prevent possibility of accident, and where the rapidity of the driver's movement largely governs service, a power wagon would not much expedite delivery, even with a helper to drive it. It would, however, have an advantage in going to and from the locality of delivery.

The Peerless truck was placed in service delivering ice from the ice bouses to route wagons and in this work it was found to have a decided advantage. The average trip is estimated at six miles, and eight loads of four tons each were delivered as occasion required, this being about the maximum. The time required for loading depends on conditions at the ice houses and the unloading upon the needs of the carts supplied. The truck replaced three supply wagons, the driver and helper of the truck doing the work of three drivers. in the work required by the company there was and now is considerable variance, because when not actually needed and outside orders were received the truck was often devoted to other work for varying lengths of time. It was not used exclusively for wholesale delivery, but its work was such as to justify the belief that with three men the truck could do as much as four horses and four men. Besides this in the event of emergency orders the truck can be loaded with any quantity of Ice within its capacity and hustled along. This enables the acceptance of orders that could not otherwise he taken, and extends the radius of the business.

The active head of the concern, Clinton A. Walch, has owned automobiles for nearly 10 years and this experience has been of material benefit in directing the use of the truck The driver had no experience until he was set at work under the observation of a demonstrator, and he has been trained to meet Mr. Walch's requirements. He is required to give whatever attention is essential to operation, but when work is beyond his capacity mechanics employed by the company assume it. In operation Mr. Waich insists upon cleantiness of the mechanism and the truck is washed each night. The mechanical attention thus far needed has been practically adjustment instead of repair. The tire wear has been comparatively small. It will be seen that so far as actual expense for maintenance and tire renewal is concorned the truck has not been used a sufficient length of time to give figures of real value.

The truck has a maximum speed of 13 miles an hour, the governor not allowing excess of this no matter what the position of the throttle or ignition levers. When the truck was first bought a hoven governor apring reduced the speed to about eight miles an hour, and Mr. Walch decided not to make replacement of the apring until the crew was familiar with the machine. This also brought the gasoline long, which was understood and too objected its. The gasoline consumption is normally about six miles to the gallon and about 100 miles is driven to the gallon and about 100 miles is driven to the gallon and about 100 miles is driven to the gallon of oil.

Horse Ouest.

Busing estimate on daily service for a variable period is unsatisfactory and to make estimate on both variable service and variable periods would appear to be sheer non-sense, but there are the best of reasons for making conclusions which will appear.

The Pocasset Ice Company ordinarily has in service about 50 horses, which number is increased by purchasing or hiring as occasion may demand. The experience has aiways been that in the time of year when the delivery was greatest the facilities were never adequate, and yet when the service diminished and there was excess the value of animals trained to the work was such that only those that had ceased to be useful were disposed of. This has meant finding work for the horses, which must be exercised when not working, a problem with which every ice dealer has to deal. It must be apparent that taking the delivery outfit of a business of this character, with the service increasing and diminishing very much, what would be necessary not more than six months of the year must be carried the remainder at no profit, if not at actual loss. This means that all kinds of haulage work is undertaken, casnal and regular, and with the time lost there is usually no expectation of anything more than keeping the service intact at minimized expense. This condition has established a price which ranges from \$4.50 to \$5 a day for the service of a pair of horses, cart and driver for regular service, and naturally something more than this when the work is temporary or for a short period. There are times, however, when service is sought that commands bigher prices. With horses the natural limitations of the animals minimizes work that would naturally he the most productive.

With this company it has been found possible to undertake baulage that borses could not do, and these long hauls have often been so arranged that both trips have been productive. This has resulted in the truck being sent for runs of more than 100 miles in a day. One of these was from the garage to Greenville, R. I., where a load of four tons of fancy apples was taken on and carried to a horticultural exhibition at Boston. Another was a delivery for a furniture dealer during which, with a late start and numerous walts, the machine made 70 mlies. Another work was carting an apple harvest to a cold storage plant, yet another was hauling lumber, still another hauling grain, and so on, It being impossible to account for this as regular service and compare it with horse work. While this cannot be tabulated for comparison its value is understood and established with the company.

In this connection the work of the Reo power wagon may be emphasized. While it was used for a few days to aupply ice to the peddling carts it has been generally sent out with special orders, ranging from a few deliverles for regular customers who had been "skipped" by the drivers or helpers to a single load demanded in an emergency call. It has been particularly useful during periods when all the service was worked to the limit, and has carried as many as 13 full loads varying distances in a day. During the shipment of ice from storage at Oxford, Mass., the wagon was sent over the road from Providence to that town and was there for about two weeks carting ice from the bouses to cars, doing the work of two single-horse carts, to say nothing of saving in shrinkage by its superior speed and the fact that one man did the work of two drivers. While the record kept shows the weights carried by this machine in delivery work no mileage or fuel, or lubricant data has been preserved. Here again the broad statement of the company as to the utility of the machine is the best that can he given. This is in effect that the Reo has been all that was expected and has been entirely satisfactory. The apeed of this machine has offset its limited capacity for ice delivery

It is apparent that service must be estimated on comparisons with vehicles of corresponding capacities and that manifestly it is impossible to utilize one type, for instance, with equal satisfaction for every requirement.

Relative to the work of the truck the following data demonstrates what it accomplished in regular service, this covering a period of two weeks and showing the mileage and consumption of gasoline, it being loaded with from 3000 to \$600 pounds of fee:

				disselle	
Date		Milenge	Total	Gale.	Total
tetober	9	400 %			
October	10	29.6			
October	11	5.2		12	
October	12	46		31	
October	13.	46			
October	14	444		3.	
			245.4	****	4.1
October	16	44.4		5.	
October	17	4.5			
October	18.	- 37		*	
October	19.	27		h	
October	20	36.4		7	
October	21.	37.9		8	
		-	211.1		35
			$\overline{}$		6m-r
			186.5		8.0

This shows an average of 40.5 miles daily and an average of 6.08 miles to the gallon of gasoline consumed. It should be said that this does not represent the maximum of truck service, but what was necessary during the period given.

The truck as a supply delivery has taken the place of three two-horse carts, and its crew of two the place of three drivers. Making comparison of the cost of the truck and horse outlits we find the following:

Herse Durnt.			
6 horses at \$350 each			
3 carts at \$250 each	750.00		
3 sets harness at \$75 each	225.00		
Incidentals	00.001		
-			\$3175.00
Truck Outat-			
Chasels	3700.00		
Body	200.00		
Incidentals	100 00		
-			\$4000.00
Operating Expense, one year-			
Interest, 4%	127.00	\$ 127.00	
Depreciation, 10% annually, horses	210 00		
Depreciation 10% annually, carts	75.40		
Depreciation, 20% annually, harness	45.00		
the first latter to a familiary to a	-	\$ 339.00	
Core and Maintenance-			
6 horses at \$1 a day	2194.00		
3 carts at 50c a day	517 50		
a carrie at the a day		\$2737.50	
Supplies	100.00	\$ 100,00	
2 drivers at \$12 a week each	1572 00	\$1572.00	
		-	\$5166.50
Truck			
Interest, 4% 101 \$	160 90		
Depreciation, 20% annuall)	500 000		
Insurance	150 00		
thedrame		\$1140.00	
Care and Maintenance-			
Tires	200.00		
Repairs	\$190.00		
Gasoline	240 00		
Oil	41 00		
Grease	20 00		
Supplies	100.00		
supplies		\$1708.90	
Attendance-			
Driver, at \$15 a week	780.00		
Helper, at \$5 a week	468.00		
Helper, at a market		\$1248.00	
			\$4096.00
			-
Difference in favor of the truck			\$1070.50

It will be noted that the truck is depreciated at 20 per cent annually, and that haif the depreciation is allowed for repair, making the cost annually for maintenance \$11200. To this should be added the tire expense. The tires are 26 by five inches on the front wheels and 40 by five inches dual on the rear, these being quaranteed for 8000 miles by the maker. The mileage of the truck is estimated at 250 weekly, or 13,000 annually. This would allow a total of 55,000 miles for the period of five years that has been the basis of estimate, and this mileage, the fact, this was bat a bird of the mileage that is placed as the life of a first class manchine by European builders.

Should there he mileage in excess of 65,000 this would be clear gain and all in favor of the truck, while it would be against the horse outfit. Of course there should also be considered the reserve possibilities, in which the truck has double capacity with an additional crew, and its greater utility during periods of extreme need. The cost would be no greater for any item save fuel, lubricants, tires, repairs, and attendance. Additional horse service could only be ob-



Ree Power Wagon 1 sed for Emergency Delivery by the Po-

tained by buying or hiring extra animals at the prevailing market price, and the drivers and animals would not be trained to the work and consequently would not be as productive.

The body equipment of the Pecriesa truck has been placed at perhaps a less price than might be paid for a similar construction, for this was built by the fee company in its own show and from selected material to meet its sexate sheet of steel between the planking to keep the with a double deck with a sheet of steel between the planking to keep the water from the melting lee dripping on the chassis mechanism, and it is drained at either side of the forward end. The sides cannot severe the body.

With the Reo power wagon the showing is remarkable because of the utility of the machine and its rapidity of movement. This vehicle is considered the equal of three single-horse carts, and with it one driver can do the work of three drivers of horses. The average mileage for a horse that is worked daily through the year, or the greater part of it, is 18, and this cannot move faster than a very slow trot under the most favorable conditions, such as when the cart is empty. The Reo power wagon has a maximum speed of 15 miles an hour and with a load of 1500 pounds it can be driven conservatively to do the work of a horse in two hours, if conditions favor. A horse could draw more than the wagon has capacity, but the greater speed of the machine more than compensates for this. The consumption of fuel is about a gallon to each 10 miles driven, and the oil consumption is about one gailon to 125 miles. The tires are 36 by two inches forward and 36 by 2.5 inches at the rear, a set costing approximately \$75. The tire service varies greatly, because of the tendency to overload all machines, but 5000 miles is not an extreme. Contrasting the work of this class of power wagon and horse outfits the following figures are regarded as not being excessive. might be said that some machines of this type, used for pleasure vehicles and driven much faster, have mileage of from 50,000 to 60,000 and are still doing good service. Obviously overloading is severe on the tires and this brings the expense of operation above that which might be realized with more attention to consistent loading. In this conclusion it is assumed that three full sets of tires are used annually, even the first year:

3 hotses at \$350	each			1	1050,00
3 earts at \$250 er	ich				750 00
3 sets harness at	\$40	each.			120 00
Incidentals					25 00

Power Wagon Complete \$ 650.00		
tower wagon complete		
Incidentals 75 00		\$ 725.00
Operating Expense, one year-		
Horses		
Interest, 47 \$ 77.80		
Depreciation, 10% annually, horses, 105 00		
Depreciation, 18% annually, carts 75 00		
Care and Maintenance. 21 00		
3 horses at \$1 a day \$ 915.00		
3 carts at 23c a day		
Supplies 50.00		
rappute	\$1551.80	
Attendance-		
3 drivers at \$12 a week each \$1872.00	\$1572,00	
n M n		\$3403 40
Power Wagon Outfil-		
Interest, 4%		
t'are and Maintenance—	\$ 223.66	
Tires \$ 225 do		
Repairs 125 00		
Gasoline 172 on		
Oll 45,00		
Grease jum		
Supplies 75.00		
Supplies	\$ 652.00	
Attendance -		
Driver at \$15 a week \$ 750.00	\$ 759.00	
		\$1636.00
Difference in favor of power wagon		\$1767.80

It will be seen that by this estimate the driver of the power wagen is paid more than the driver of the lee and To make this comparison it has been necessary to assume that the same work was performed every working day the year, a condition manifestly impossible with the dearer. To understand the extremely variable character of the

ice dealer's traile it may be stated that, assuming the demands of the summer business to be 100 per cent. Or five months the volume may be placed at maximum, for four nonths of the year at 50 per cent. and for the remaining three months from 15 to 20 per cent. And there are periods when with all available facilities it is hardly possible to meet the demands.

With horse service with the shrinkage in business three on be little difference in the maintenance expense. If not worked the animals must be exercised, they must be given the same attention in the stable, and feed slightly less. The might be some saving in the expense of drivers, but this is the only possibility of economy.

With the truck and power wagon the saving is aurprisingly large. Place the two in the garage, jack them clear of the floor, grease the exposed metal and wrap the tires



Reo Power Wagon as Londed for Contract Delivery for a

to keep them from the light. The only fixed charges to continue are interest and insurance. It might be consistent to charge off a small percentage for depreciation and for tires, but there could be no other maintenance cost. Stor-

age must be provided for the machines, which would correspond to stabling for the horses.

The cost of the machines withirawn from use would be not more than 10 per cent. of the operating expense, making a illustral estimate

The cost of the animals when unproductive would be at the least 80 per cent, of the normal expenditure, for depretalents on the constant, it being possible only to make material saving in the reduction of attendance. In this respect there also is a difference that is not apparent until analysis is made that the constant of the const

tion is that the owner of any form of transport would desire to utilize it as much of the time as is possible, but where the conditions will not permit this the absence of operating expense is a decided advantage.

The Pocasset Ice Company has found it possible to utilles its track and power wagon by making contract work of different kinds, and while there are limitations to the uses for which they are adapted because of body construction it is a fart that they are better than the earns employed for lee distribution, because such carts can be used attacts owning or hiring other forms of carts and wagons suited for such service.

SPEEDWELL COMPANY'S CAMPAIGN OF EDUCATION.

WORKING as a special representative of the Speedwell Motor Car Company, Dayton, O., H. Harry Croninger is travelling over the entire South on an educational nisison, endeavoring to show the merchants and manufacturers of that region the exceptional advantages to be gained through motor vehicle delivery. His position is made clear in the following interview granted an Atlanta paner:

"First of all, let me impress the fact that I am not a assieman, nor old I wish to sell anyone a truck. My work in the South is purely educational. I want to investigate the situation and if possible interest the business men in the advantages accruing to them by the adoption of the bount reach, we hope it will be, but I am trying to show by arguments and figures the financial saving to be derived, whether it be the Speedwell or some other good markine.

"We are living in an age of progression; an age wheremodern methods of business are essential, and in every line of endeavor we discard the old and inadequate forms for the more recent ones that show a marked improvement—asbettering of production and service, and financial saving, the theorem of the control of the modern inventional that does show these things, and in the course of time it will entirely displace the horse and mule for delivery purposes, just as surely as the steam railway has taken the place of the old stage coach.

"The purchase of trucks by the large operating companies is made after a thorough investigation. They acquire this information from every state, and the accompanying compilation of operating coats is made up from records furnished us by owners. Unfortunately we cannot secure equal data regarding the cost of operating horses and wagons. Careful search and investigation have been made extending over a long period, but we fail to find any operating company or even individual that really knows what the cost a ton a mile is by means of horses. We therefore can only quote what many of the express companies and large merchants say—that a six-for more truck will make the same trip in about one-half the time of horses, and that four reachs with four drivers will of slopkee eight drivers and

"Of course, economy depends entirely upon ton-miles, and unless the merchant has a tonnage he cannot effect economy. His advantage is then one of service and quick response to customers. It is recognized that the merchant who has a bis command a means of instant service or delivery is the one who will see the husbing.

"The tenacity with which some business men cing to the an old method of transportation is astonishing. Commercial conditions have demanded commercial trucks. A busy man would not consider taking a local train from New York to Chicego. He demands service and quickness, so he takes an 18-hour train. A few years ago we were content and considered it remarkable to cross the Atlantic in seven days. Commercial conditions and commercial men have forced better service, and today we find it of five and even

"The motor truck comes under the same category, and the merchants and operating companies have forced the manufacturers to produce a means of rapid, dependable and economical transportation of merchandise, and are wonderlag how they ever got along without it. "By the estimate herewith is shown clearly the economical point, it will be noted that I give \$400 a year for up-keep, but with careful driving and a good service department an eart think down to \$250 a year. This is a saving a ton-mile. He can cut his depreciation from 20 per cent. to I.2. This is a possible saving a ton-mile. 18 grape per cent. to I.2. This is a possible saving a ton-mile. 18 grape expenses. If he use three trucks and has an equal space for six horses, this can be cut to \$10.0 a month. This is a saving a ton-mile, but it is my idea to give a good, liberal estimate.

"We find that the cost of operating by horse and wagon is 36 cents a ton-mile. The following is the cost of operating a four-ton truck, based on 40 miles a day of 10 hours; six days a week; 304 a year; speed, 12 miles an hour; gasoline, 5.5 miles a galion:

	Α	Mile
Basoline, 11 cents a gallon	\$	0.020
Oit, etc., 39 cents a gailon		0,00
Repairs and replacements, including labor (\$600 a year)		9 04
Ttres 17000 miles guarantee)		0.060
Garage, \$10 a month.		0.07
Driver, \$3 a day		0 075
Insurance (\$3000 fire, \$5000 Hability, \$1000 to others)		0 015
Depreciation, 29% on \$3500		
Total, a mile	. 1	
Total, 40 miles a day		2.18

ECONOMICAL REO DELIVERY WAGON.

That the light delivery wagon is more economical and efficient in every way than the borse is well shown in a report received recently by R. E. Olds, preadont of the Received Proceedings of the Proceedin

This is an average of 30 miles a day with a maintenance outing of 50 cents a day, and less than 1.75 cents a mile. The earnings were \$300.54, which means that the Reo truck not only earned its purchase price of \$750.00 ting the first six months of its use, but actually returned the owner a net cash balance of \$150.54.

SPECIAL COAL DUMPING VELIE

The matter of special body construction for differing lines of business is receiving renewed attention in all quarters. Lin McKie, manager of the commercial department eters. Lin McKie, manager of the commercial department of the Veile Boston branch, is showing a patented coal dumping body, recently placed in the market by the Veile damping body, recently placed in the market by the Veile chaosis. The construction is such that the coal may be dumped from either side or the rear, and the body may be elevated to shute from any angle. It is built so that traffic will not be obstructed and is considered by many lioston coal desires who have seen it to be a devided forward step in the matter of the andling this product.

POWER WAGON ECONOMY IN LUMBER TRADE.

E CONOMY in the power wagon is assured to be chiefly in the saving of time, but there are other qualities hardly less important. The mechanical transport has established its value in service because of superior speed, and

saving is material and is really larger than appears on the face of the comparison because this economy affects not only the drivers, teams and equipment, but includes the work of the men handling the tumber in the yard as well.



Sampson Four-Ton Truck with Holler Equipment for Londing and Unloading in Service of Shevlin-Carpenter Lamber Company, Minacapatia, Mina.

experience in the use of these vehicles demonstrates that methods, aside from actual haulage, may be improved with corresponding returns.

The adaptability of the motor wagon is a large factor in its favor. Apparently there are no

its tayor. Apparently there are no limitations in its use and besides the mileage that may be obtained and the larger loads conveyed, expedition in loading and unloading, that the machines may be kept at work with the briefest possible stops, is a logical requirement.

It is apparent that the long hauls are the most profitable with any conveyance. Stopping means lessening productiveness, and this leads to systematizing any attending lahor so as to minimize waits and stops. Such organization is possible with motor wagons because of the regularity and dependability of the machines. To use a truck with a minimum of lost time has been very fully realized in the case of the Shevlin-Carpenter Lumber Company, Minneapolis, Minn., which is one of the largest concerns doing business in that section.

The Shevlin-Carpenter contpany has in its service a Sampson, truck of four tons capacity and after experiment with it methods were adopted for unloading and loading which furnimize the work and give decided satisfaction. The

The truck as delivered to the company was with a longer wheelbase than is standard and the deck of the platform contained a series of rollers with longitudinal corrugations extending from one side to the other These rollers support the weight of the load and on them freights of lumber are pushed forward or bulled backward with minimized effort. The rolls are seven in number and two are connected by gears with winch handles, by means of which the load is carried forward or backward as desired. The two winch rollers. are at the front and rear with the gearing so compounded that a load may be moved with comparatively little effort.

With the utilitation of the truck it was necessary to facilitate the loading and unloading and the handling in the yard, and to adopt methods that were somewhat at variance with tradition and custom, such as giving over the piling of the loads with the forward end above the driver's head and carrying the driver's head and carrying the driver's head in the piling of the loads that the transfer of the piling of the load in loading long timber.

It was decided that the loading should be done so far as possible without the truck and to accomplish this a two-wheeled carrier with a long plank reach was ntilized. These had been employed for moving material short dis-



Nampson Truck Just Landed and Piled Lond Rendy for Londing on Carrier in Yard of the Shevila-Carpenter Lamber Company

taness about the yard. By pilling or packing the lumber with one end on the axis of the carrier and the other on wooden horse it was possible to make up loads at any convenient time, and to have these ready so that on the arrived of the truck it is backed to them and by use of the rollers and winches a load is earlied on to the truck shiftern.

It will be apparent that the loading may go on at such a rate there is no delay on the return of the truck to the yard. The lumber is packed on the carrier and at a height so that the truck may be backed partly inder it. Then the lumber is lowered by removing the horse and when the weight has settled on the general collet a workman by simply turning a crank draws it on to the platform and forward as far as in necessary. The rear roller does most of the work loading and subscillar, and the forward roller to start it backward on the truck.

The lead as narked is secured by a chain passed about it at the rear end, or that originally above the aide of the carrier, which retains it no matter what the movement of the truck. The while is afriven to the sector of the delivery and the place where the lumber is desired is beared. The machine is then backed or driven to this place and with the which handles the rollers are turned and the lead is backed off the platform until the rear end, retained by a chain, drops to the ground. Then the truck is driven sheed and the lumber dropoud exactly where it is desired. him; give references for the last live years; pass a rigid medical examination, and his appointment must receive the approval of the fire commissioner.

The corps is supplied with suitable apparatus intended to save life and preserve property at or after a fire. The to save life and preserve property at or after a fire. The work is principally that of preventing unnecessary water damage, and for that purpose the mea spread is 8y 22-foot admange, and for that purpose the mea spread as 8 y 22-foot and provided the property of the p

Hoston has three separate commands. Company I covers the territory north and east of a line drawn from the west literature of the control of

Company 2 has that section south and went of the previous boundary and extends to a line drawn from the Charles river through Massachusetts across, Southampton street and Andrew square to the water front, including that portion of South Boston not in district 1. This command has one automobile and one horse drawn saxon. Comtain the street of the street of the street of the district 2, including Roxhury, Dorchester, West Roxhury, and Brighton, and has two moor cars.

The horsed wagons each carry two 18-foot extension



Unionding Shevita-Carpenter Lumber Company's Truck by Roller Equipment,



Load of Lumber Deposited in Stack Saving Time Pausily Taken for Unloading.

and neatly piled, so further handling heing necessary.
With this truck it will be seen that its loading and unloading is minimized so that the greater part of the time of the vehicle, with its power, speed and endurance, may be devoted to actual transportation. The fullest value of the truck is so utilized and the hushress of the firm in extended the companies of the companies

BOSTON'S PROTECTIVE DEPARTMENT.

A resture of public service in the larger centres, which is finding much favor in some of the smaller cities, is that known as the protective department, usually maintained in connection with the incorporated insurance companies doing business in the community. While in resility it is a part of the first department and is so recognized as far as legal provisions are concerned, it is somewhat distinct, in that to the amount of premiums returned, and in proportion to the amount of premiums returned,

In Boston, for instance, the force consists of 61 men; a superintendent, three capitains, two first Bieutenants, four second lieutenants, 33 permanent men and 18 auxiliaries. A candidate for the force must be under 27 years of agic able to read and write English understandingly; a citizen of good moral character; have no record of crime saging

ladders and 25 covers. When more are needed they can handle shout 150 at a load. The automobiles usually take about the same number, but of course, are able to carry a much greater supply when needed. The carr attached to Company 3 must make longer runs than any of the others, sometimes as great as seven miles. During the last year these machines covered 4365.5 nitlea in answering alarnss.

So successful have the automobiles proven in this severe service, suggestion is made that insurance companies in much smaller cities would find it adviseable to consider their raw. Inamuch as it is possible to do effectual work in saving unnecessary loss where runs of seven miles are undertaken, it readily may be seen that one car properly equipped would be able to cover the thickly settled portion of most cities and large towns. As has been stated, previously, it is a matter which is receiving much favorable attention in many localities at present.

NEW YORK BRANCH FOR MOTZ TIRES.

The Motz Tire & Rubber Company, Akron, O., has opened a branch for its Motz tires in New York City at 55th street and Itroadway. E. P. White, formerly connected with the Goodycar Tire & Rubber Company, is the manager.



FIRE DEPARTMENT NOTES



The new year will see another piece of motor projelled apparatus added to the fire department at Indianapoits, Ind. as the delivery of a combined hose and chemical wagon be expected early this month. In the accompanying illustration is shown the automobile which was made by the American-La France Fire Engine Company, Eliniar, N. V., and which is fitted with a 40 gallon chemical tank and reed of hose as well as 1200 feet of 2.5-lich hose and nead equil-

The vehicle is propiled by a four-vylinder, four-cycle, water-cooled mix-line broken and is rated at it he free power. I gnition is by Bosel dual system, including storace batteries, and the clutch is a multiple disc. The gearbox provides three speeds forwards and reverse and final drive is by side chain. Premarkities and results are fitted, single to front wheels and dual to the rear. The wheelbase is 140 inches.

The following cities and towns are considering or have appropriated money for the purchase of motor propelled fire

The residents of Thompsonville, Conn., jurned out en masse recently when the Knox combination chemical and hose truck, made by the Knox Automobile Company, Springfield, Mass., arrived and was turned over to the fire department by Vice President Alvin D. Higgins of the Hartford Carpet Corporation, donor of the machine. The parade was headed by the Carpet City band, followed by the new machine after which were the various pieces of apparatus and members of the company. The line of march was through the principal streets and much red fire was burned in honor of the new vehicle. At the fire house the machine was formally turned over and the committee thanked the giver in an appropriate manner. The motor car is propelled by a 50 horsepower engine and is one of the latest turned out by the Knox company. It carries a 40gallon chemical tank, also three-gallon hand extinguishers. and is fully equipped with fire fighting appliances.

White Plains, N. Y., has received a combination hose and chemical wagon from the Locomobile Company of



Hose and Chemical Automobile Hulli by American-La Pennce Fire Engine Company for Phy of Indianapolis, Ind., Which Will He Pinced in Service This Month.

apparatus: Lakewood, O.; Elmgrove, W. Va.; the Fire Fame Company, Wilmington, Diel; Dayton, O.; Sunter, S. C.; Kalamazoo, Nieh.; New London, Conn.; Chambersburg, Penn.; Derby, Conn.; Merdien, Conn.; Waltegan, Hil.; Pasadena, Cal.; Terrell, Tex.; Rome, N. Y.; Newport, O.; Bhreveport, La.; Blakersfield, Cal.; Ottawa, Hil.; Zanewille, O.; Mattoon, Hil.; Mankato, Minn.; Wilmona, Minn.; Charlotte, Mich.; Petaluma, Cal.; Sherman, Tex.; Masillon, O.; For Collins, Col.; Albernjuerque, N. M.; Port Wayne, Ind.; Manltowee, Wit.; Everett, Wash.

Another point in favor of the automobile was brought out recently in New York City, which has installed many pieces of motor driven fire fighting devices. The water tower in the clumelast vehicle to handle, especially when backing into quarters, and with horses the operation usually consumed 15 minutes or more. With the motor it is a simple matter for the chauffeur to straighten it out and back right in, as he has no week in the simple with the property of t

America, litidgeport, Conn., and the machine was designed and constructed for heavy service. The car is, propuled by a foar-rylinder, four-cycle, water-cooled motor with a five-linch bore and alsi-fine stroke and its horsepower is rated at 60. Drive is by side chains and a four-speed forward transmission is employed. The vehicle is palitted white with nickel trimmings and will accommodate 10 men in addition to the driver. Two 33-gailon rhemical tanks as well as hand extinguishers are carried. In addition to the 230 feet of chemical hose the capitalment includes the usual lire fighting appliances. Irvington-on-the-Hudson has ordered a saliniar mackine.

Waterloo, Ia., is said to be the first in that state to adopt the mechanically propelled für apparatus, having controlled ed for a combination hose and chemical wagon to cost \$25.50. The special equipment consists of a 40-gallon closed ical tank, and 12,000 feet of hose. The vehicle weighs 7200 rounds.

The Winnipeg, Man., fire department is advertising tenders for a second automobile hose wagon, and it is

stated on good authority that the city contemplates the conversion of the entire life lighting until to motor vehicles.

The result of the first practical test of the automobility engine and hose wagon reventy placed in service at Ottawa, Unit., was such that a fire loss was kept down to \$200, which with the ordinary methods probably would have been at least \$3000. The fire in question broke out in the attic of a large dwelling. A line of ordinary hose was tail on the outside of the building, while the chemical artenut was utilized on the indide. The result was that the flames were extinguished with a loss confined almost entirely to the unject part of the loss. On the confined with the state of the second was been considerable. The chief of the department was well pleased with the result.

Two outflis of chemical fire apparatus, mounted on chassis made by the White Company, Cleveland, O., were change, cleveland, O., were clearly of the Company cleveland, O., were consistency Johnson of the New Johnson of the

cle which was overhauled and painted recently be equipped with fire fightling appliances. If the authorities do nor have the funds for this purpose the firemen propose to contribute the money.

The expense is an important factor in the cost maintenance of automobile fire fighting apparatus and in a resent letter to the Goodyser Tire & Rubber (tompany, Akrol, O., Chief Mertz of the department of that city gives some standard of the control of the cost of the vehicle weights 7500 pounds without men. Since that time thas covered approximately 2000 miles, and is answering alarms carries, on an average, six men and sometimes as many as 14. During the two years of use the shore have not delayed the machine in responding to alarms and it is stated one of the casings contains its original air.

Lakewood, O., has passed an ordinance calling for a bond (saute of \$15,400 to purchase motor apparatua, and Elmgrove, W. Va., has authorized the purchase of a chemical wagon and hook and ladder truck, both fully equipped.

Fire Commissioner Johnson of New York City has written Mayor Gaynor, cailing attention to the condition of



Chemical Fire Apparatus Fitted to White Chassis Reing Tested by Arn York City Fire Department,

attuction was such that a good draught prevailed.
When a match was applied it blazed fereily and it was allowed to burn some little time to obtain a good headway, before word was given to the fremen to turn on the atream from the chemical wagons. Three mainters later it was merely smokline mebers. The five was checked so quickly and the properties of t

scene of the conflagration.

West Haven, Conn., has found its first automobile fire earlies to statisfactory that another machine is to be added and utilized as a flying squadron. The first wagon was severely tested and even driven through streets increasingconsidered impassable for vehicles. Once the wheels sunk up to the hishe in a muthole and the motor stalled, When restarted the engine backed the vehicle out, and in a second trial went through with a delse of but a few seconds. Two the words of the second of the second of the second of the machine and others are being instructed for the purpose of diving the new motor car upon its arrival.

The members of the fire engine company of Pocasset, R. I., have made a request that the converted pleasure vehisome of the streets in the central portion of the city which are no bad that the automobile fire apparatus cannot them. Many obstructions and breaks in the pavements are noted. The investigation is being made in view of the fath that within the next year 150 pieces of motor apparatus will be in service, as a ngainst 22 automobiles now being used.

Fire Chief A. V. Bennett of Hirmingham, Ata., which city is replacing its borse drawn equipment with motor propelled apparatus, will add six more combination hose wagons to those already in service. The new machines will be similar to those being utilized with the exception that the motors will be more powerful. According to the chief the automobile is four times less expensive to maintain than the animal and during the first month of service, figures show that Hose Wagon No. 1 answered 45 alarms, traversed 578 blocks, used 55 gallons of gasoline, one of cylinder oil and 25 pound of grease. The total cost of this maintenance was \$5.81. Another similar equipment answered 50 alarms, traversed 930 blocks, practised two hours, used 35 gallons of fuel, two of oll, .25 pound of grease, and changed a gas tank for \$6.71. A converted steam engine answered 21 alarms, traversed 325 blocks, used 46 gallons of gasoline, about one of oil, one pound of grease, replaced dry batteries and a gas burner for \$5 11



MECHANICAL NOTES AND

TIPS FOR DRIVERS



GENERATOR TROUBLES AND CAUSES

Many commercial vehicles utilize a generator to supply acceptance to the headlights and while these devices are efficient when handled properly, they give more or less trouble if neglected. They require attention other than replenishing the caphide and water as will be explained herein.

Acetylene is composed of 12 parts of carbon to one of hydrogen by weight, or 92.3 per cent, of the former and 7.7 of the latter. Its density is about .91, and its weight at 32 degrees Pahrenheit is .073 pound a cubic foot. It without color, has a strong odor, and is poisonous to breathe, in about the same degree as ordinary gas.

It is manufactured by combining water with calcium carhide, the latter being a mixture of coke and lime which has been fused in an electric furnace. The carhide la reddish brown and gray, somewhat crystalline, and decomposes

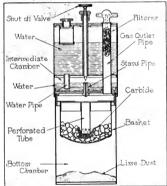


Fig. 1-Depicting the Components of a Conventional Type of Generator and Method of Operation,

in the water like ordinary quicklime, which it is in fact, when the calcium has combined with the oxygen forming oxide of calcium. At the same time the carbon unites with hydrogen, resulting in the desired acciylene.

Pure carbide of calcium will produce 5.4 cuble feet of gas a pound, but the commercial product rarely yields more than 4.5 cuble feet. This is the most hrilliant illuminating gas known and will give a light of about 2.40 candlepower when burned at the rate of five cuble feet an hour, while good coaf gas only results in 16 candlepower at the same rate of combustion. Acetylene can be reduced to liquid form at a temperature of 60 degrees by a pressure of about pounds a square inch. It corrollers by a pressure of about one not affect to any great extent, brans, iron, lead, the or

If acetylene were burned with an ordinary jet, it would

have a yellow tist as with illuminating gas, but when utilized in the lishting system of the automobile it is mixed with air. This mixing is brought about by the arrangement of the burner which is provided with openings for both the gas and atmosphere. Those of the former face each of the control of the collection of

The generator employed on the motor car comising of a water tank, separate compartments for the carbide and gas, and a fitter chamber. Water is dropped on the carbide by one of several methods, and as soon as the two come in contact, the latter begins to decompose, giving off gas as previously described. This collects in a reservoir, and by its natural pressure forces its way through the filter terral, the carbon thereis belief arrested.

When the pressure rewches a certain point it is cut offsiand no more is generated until this falls again, allowing the water to flow once more. At Fig. 1 is shown a sectional view of a generation and the principles of regulating automatically the dripping of the water. When this is poured into the upper tank it runs down into the second chamber by means of a connecting pipe, and overflows the standpipe. If there be only atmospheric pressure in the lower compartment, water will drop freely into it. However, will generate gas, the pressure of which is communicated through the standpipe to the middle chamber and forces a portion of the water hack into the tank.

The sas escapes through a tube surrounded with water to espit to and in forced unard through a filter and one or more outlets. As it leaves the pressays in the carbide receptated distinsibles and the water in the middle chamber rises until it overflows the standpipe again, when the same process is repeated. Constant pressure is thus maintained whether one or more hursers are being utilized. Thus it will be seen that an increase above normal stops the dripping of the water and that a fall below that starts the finit.

When a generator is performing its proper functions the deposit of lime dust in the bottom of the receptacle will he dry. This denotes that the carbide is clean and in condition to respond to the next drop of water. If the hurners and tubing be clear there should be sufficient gas at the tips to produce a good white flame. When there is a small flame at the jets and the pipes are free, and upon violently jarring the generator, this flares and then dies away, an examination of the carbide holder will show a dense, soggy mass, through which the water percolates with difficulty and the pressure is lowered. When the car is traversing smooth roads the wet lime, swollen to about the bulk of the carhide whence it originated, packs itself around the remaining lumps, with the same result. When the automobile gives a jolt, the packed mass is loosened, and the water rushes to the carbide causing a violent flaring at the burners. When the generator is shut off, and the lights continue to burn for some time, it also denotes similar conditions. To obtain satisfactory results the gas should be delivered to the burners clean, cool and dry and a filter ia incorporated to catch the impurities and the generating chamber is water jacketed. If the vessel be left for a long

period there should be no deterioration of the carbide. If it dissolves it is safe to assume that the device is at fault.

In some types the drlp of the water is regulated by wicks or strands of string. These may become clogged and usually are so arranged that they may be removed and cleaned. It is also possible that the filtering device may become fouled or that where drip pins are utilized they may have become bent or dirty and thus fail to perform their function. Lime acts as a heat retainer, causing the formation of tarry compounds from the gas, and when the lights are extinguished the water in the lime is sometimes sufficient to consume all the remaining carbide. It is essential that the lime should be separated from the carbide and should drop to the bottom of the container. It is also necessary that the perforated tubes around which is placed the carbide should be clean as well as dry to obtain the best results. If upon cleaning these members, and other working parts of the device, faulty operation should continue, it is best to ship it to the manufacturer.

Hefore condemning the generator it will be well to examine the tubing and the burners. The latter should be removed, making possible a test of the pipes for obstructions. Many drivers examine burners by blowing through them without closing the air apertures, and when cleaning them with a tire pump also fail to observe this precaution. There is a needle-like device upon the market for clearing jets which will facilitate the operation.

More or less moisture is present in the tubing, this heing condensed from the gas. This occurs in the first 12 inches or so after leaving the generator and consequently the piping and rubber connections from the vessel should slope directly downward to the lowest point in the system and continue a foot or more in order to drain any possible moisture toward the generator instead of in the direction of the lamps. Satisfactory lighting is not obtainable with copper tubing although commonly used. It is too soft to hold its shape and consequently sags, forming pockets in which the condensation is likely to collect. This small piping clogs readily owing to the chemical action of acetylene on copper, which produces a hiack scale. The action is sometimes so rapid as to choke a .125-inch pipe in a few weeks. The proper material is brass, .25 inch inside diameter, although it is known as .125-inch pipe size. It is sufficiently large and stiff to bold its shape and does not clog easity.

In removing the residue of carblde that has become caked to the device it is bad practise to employ a file, a screw driver or any metal, because the residuum left by the carbide after the generation of acetylene attacks the copper of the receiver and chemically combines with it, forming a substance known as acetylide of copper. This is a highly explosive product and does not require much excitation to set it in action. If metal be used in cleaning, the process should be performed in water. A scraper of hard wood is preferable.

CARE OF STORAGE BATTERIES.

Many trucks are equipped with storage hatteries either for starting or an auxiliary, and unlike the dry cell these require care and attention in addition to charging. They should be tested frequently and when the discharge limit of I.8 volts a cell is reached they should be recharged. All corrosion should be cleaned from the terminals and these members treated with white vaseline or some anti-sulphuric acid solution. When the binding members are frozen and will not loosen easily, force should not be employed.

When the application of kercsene fails to move them heat will have to be applied, but care should be taken not to expose the lead of the lug to the flame. The best method is to heat a piece of metal and place it on the nut or screw member. The metal should not be too hot, but more at a black heat.

When the terminals of the wires leading to the battery are corroded, which is indicated by a green deposit, this should be removed and the metal covered with vaseline. As the corrosive substance is more or less a non-conductor of electricity it should not be allowed to gather. A little care in this respect will lengthen the life of the battery as well as increase its efficiency.

REPAIRING EXPANDING BRAKES.

Some cars are fitted with the expanding type of brakes and these may be metal to metal or lined with friction material. They are actuated by a cam which spreads the members designed to grip the drum of the wheel. The evpanding device and faces of brake members may be so badly worn that but little friction is set up between the contacting materials. At Fig. 2 A is devicted a brake of the expanding type with the cam and faces in this condition and it is obvious that the member will not function properly.

A simple method of building up the faces is shown at The metal is drilled and tapped to take two cap screwa and these may be adjusted to the opening required and then locked as outlined at C. Another method is to rebuild the faces with a strip of metal, the latter being fastened by machine screws. The holes for these members should be countersunk,

POPE-HARTFORDS DELIVER BREAD

The Acme Tea Company operates a chain of over 200 stores in Philadelphia and suburhs, and in addition to its

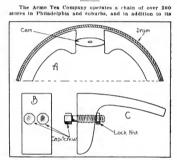


Fig. 2—Some Brake Hints: A, Expanding Type, the Cam and Faces of Which Are Worn; B, Repair Made with Cap Serewa; C, Mrthod of Adjusting and Locking.

tea trade carries on an extensive baking husiness. Early each morning the freshly baked bread must be delivered to the various atores with regularity and dispatch. The company has in service two Pone-Hartford three-ton trucks. made by the Pope Manufacturing Company, Hartford, Conn., and will place the third in commission within the near future. After the day's supply of bread has been distributed the cars can then he used for the purpose of general delivery.

COMPETING WITH RAILROADS

An effort is under way looking toward the organization of the Haverhill Auto Express Company, which is to operate a fleet of motor trucks between Boston and Haverhill, Two or three vehicles have been in service over this proposed line for some months making regular delivery of goods. The new plan contemplates the use of at least seven machines, to be started from Boston at one-hour intervals, beginning at 5 in the morning. These would deliver their loads in flaverhili and pick up shipments to be delivered on hoard the New York boats that night, reducing the time necessary to reach the metropolis by at least one full day

OUICK DUMPING WAGON AND TRUCK BODY.

H ANDLING of the load is a problem of much importance in vehicular transportation. The minimizing of time and labor in loading and unloading has been given much attention. This applies to animal as well as power driven

wagon is such that the tires rise above the top of the frame side members and as it is necessary to have the centre of gravity as low as possible this construction necessitates a body that will have a width of about 66 inches at the for-



Also Truck with Monghan Dumping Body of Six Tons Capacity, Without Flare Boards, I tilized for Hautage of Coal.

transports. Many devices have been perfected for unloading different materials and commodities from wagon bodies, some only useful for special service, and others more general in their application and use. Naturally those which may utilize the one equipment for the greatest number of purposes can be regarded as being the most serviceable,

A body that has many qualities and features is the dumping outfit built by the Monahan Vehicle Company, Providence, R. I., with capacities ranging from two to 10 tons, and which bodies are used very broadly. This body is constructed of No. 16 steel plate, there being generally three and sometimes four plates forming the sides and bottom, and another the forward end, while the end gate is a separate construction that is suspended from the top of the sides at the rear end.

The proportions of the material differ with the capacity of the body, the allowance being 37 cubic feet for a ton of bituminous coal. It might be stated that 40 cubic feet is the accepted average for a ton in general merchandise transportation. This is, of course, exceeded when the bulk is large and weight proportionate to or less than bulk aver-

This body is mounted on the chassis that the forward end may be elevated to give the body an angle of 42 degrees, considered sufficient for the gravity movement of all loads save under unusual conditions. To so elevate the body it is necessary to locate the fulcrum of the unloading apparatus practically above the rear axle, and that the rear end of the hody may be lowered, the rear end of chassis frame is cut off. This means simply shortening the side members of the frame and restoring the end member and

the reinforcements and stays. The size of the rear wheels with practically every power

ward end and 78 inches at the rear, with side plates at a height and length to give the required capacity. The rear end of the body must extend beyond the chassis frame from a foot to two feet. Perhaps 18 Inches is a fair average As the body is wider than the chassis frame, to elevate it sufficiently above the wheels to permit of full spring action a wooden frame ts fitted with sides that in large hodies are 12 inches in height. From the fulcrum point to the rear of the chassis frame the sides of the wooden frame slope at an angle of 42 degrees. Forward of the body the sides of the bolster

height. This space is heavily

decked with oak for the installation of the hoisting mechanism, which is boited to the frame. The entire hoister frame is left open to give fullest accessibility of the gear case, jackshaft, driving shaft, etc.

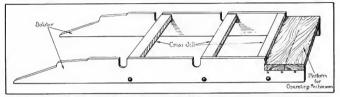
When the hody is elevated it is supported by the holsting gear forward and by two heavy hinges, one at either side of the chassis. These hinges are riveted to the bottom of the body and its frame and bolted to the bolster, the bolts passing through the bolster and the chassis frame. The bluges are milled so there is a precise fit. When the body is raised it is entirely clear of the hoister. Three steel members, the transverse shape and size of the body, are formed of T plates, these being with wings two inches wide and .3125 inch in thickness. Two other steel members are made in angle form with wings two inches wide and of the same thickness. The two steel angles form the end frames



Monahan Dumping Body Flifed to Alco Truck Elevated to Fulles) Heigh) for Unionding-Rody Designed for General Haulage.

of the body and the three T plates the centre members, to which the body plates are riveted. The tops of the side and end plates are reinforced by a steel angle of the same proportions securely riveted. Across the rear end at the top is fitted a sized rod or bar which stiffens the construction and on which the end gate swanzs. The end gate is a sized plate reinforced as is the body, and when lowered it is held by a transverse bar which is constructed with two

ways. The object of the convention was a discussion of toon truck selling methods and an effort to secure intelligent understanding of conditions, in the opinion of the Speedwell company commercial vehicles should be sold only



Plan of Bolster for Chassis for Installation of the Monskan Patent Dumping Body, Adapted in Proportions to the Size of the Frame and Body.

small lips which bear against the lower edge of the gate, which bar is operated from the side by a hand lever.

The holsting mechanism consists of two racks attached to the forward end of the body, at the end of the transverse body plate, the lower end of the racks extending to about the height of the front axle. The ends are stayed by rods having angles of about 45 degrees riveted to the bottom of the body, close to the side, and to the body frame. While the body rests on the bolster normally it is isossible to raise it easily by a crank which operates a succession of gears and pinions that mesh into the racks. This hoisting apparstus and the body are patented devices. It is claimed for the body that it may be elevated to its full height with any type of vehicle in less than two minutes and the load de-posited wherever desired. The truck or wagon may be backed to any point and the load dumped, the body not being in contact with the ground. Obviously the lowering operation is quite as easily accomplished. Thirty-one revolutions of a hand crank raises or lowers the body.

Bodies of this class are built for hauling of eval, brick, stone, gravel, samb, building macerials, ice, and, in fact, any commodity, Including lumber, for the load may be drawn out when one ond rests on the ground. All contents all-do the smooth metal flour of the body. These bodies have been constructed for velticles in all parts of the country and shipments have been made to southern California by this company.

APPRECIATES TIRES AND SERVICE STATION

That the service stations of the United States The Company, New York City, are appreciated by the merce of commercial selectes, is shown by several letters received by that company one of which is reproduced herewith. Wrights from Springfield, Mass, the manager of the Saurer Motor Truck Agency, states: "I can recommend your tree with pleasure, as we have been using them on all our trucks for over 18 months and have had very few replacements; every one entirely assistance in the comment of the company of the com

SPEEDWELL DEALERS IN CONVENTION

In an effort to improve the details of salesmanship with respect to its product in particular, the Speedwell Notor Car Company, Dayten, O., maker of Speedwell trucks, invited its desicrs in all parts of the country to assemble at the factory, Dec. 11 and 12, paying their expenses both to those concerns which unquestionably will profit by their use, and that cars should be no represented persons to the sale that the purchaser will be acquainted with every probable item of expense connected with their operation and maintenance. This convention is indicative of the thorough meaner in which this concern is pursuing the matter of sales.

SAMPSON IN TELEGRAPH SERVICE.

The commercial vehicle has invaded another field and this time it is the relevants division of the betroit fire department. The authorities conducted a series of rests with a 2000-00000 Sampoon truck made by the Alden Sampson Manufacturing Company of that city, a constituent of the Trutted States Motor Company, New York City. The car was commissioned to deliver supplies that oil of the fire stations in the city and completed the circuit in eight hours. A team of horses required from two to three days for the

The telegraph division uses the machine to draw cables through underground conduits and in the accompanying illustration is shown the apparatus at work. A winch, driven by the power of the motor, and operated by a lever, winds



Pawer Driven Winch I dilated on Sumpson Truck for Drawing Cable by Detroit Fire Reportment.

the cable, superseding the slower method of a haml windlass. The automobile is in service might and day and in addition to replacing the horse equipment formerly employed, performs work that required additional teams

POWER WAGON AMBULANCE AND HEARSE.

THE requirements of those who desire to utilize motor to vehicles for business purposes are such that specialization in body equipment for attandard chassis is becoming more and more necessary. Those who have need to be for commonplace service often seek something distinctive in design and vet absolutely serviceable and enduring.

An excellent example of the possibilities in work of this character was recently delivered by the Monahan Vehicle Company, Providence, R. I., to J. P. Cleary & Son, Itoston, Mass, this being installed on a Sampson 1300-pound power wagon chassis and purposed for a combined undertaker's ambulance and wagon.

The chassis was sent by the builder to the works at Providence where the body was designed and constructed. The accompanying illustration gives an admirable idea of the general design. The body is eight feet in length and 43 inches wide, with the sides of the seat enclosed and the roof carried forward of the dans hise inches. The sides of the body proper are unbroken and are finished with modifies that forms panels, the upper and lower being wide modifies that forms panels, the upper and lower being wide before centre one agreement.

At the rear is a step carried on brackets and above this



Specially Built Body for a Combination Ambulance and Hearse Installed on a 1500-Pound Sampson Chassis.

double doors open cutward, these doors being fitted with windows that drop into the lower section. At the front of the body and behind the seat for the driver is a window that swinag from the roof and which lifts inside the body, where it may be hooked if desired. The interior of the body is the natural wood and at the sides are racks, raised or lowered as occasion may demand. The floor may be removed for rendy access to the chassis mechanism, and the state of the state of the state of the state of the load that may be carried. The body may be closed tightly as protection against dust in the event of a length vila-

The sides of the body are carried forward to enclose the sides of the seat, a lengthy bracket supporting the extension of the roof. Into the sides are fitted large lights of heavy plate glass, affording the driver a view of either side of the way. The foot room in front of the seat is ample for comfort and the cushions and back of the seat are luxuriantly upholstered in turted leather.

The protection of the long hood can be increased by the use of a storm front or windshield and in cold weather one or the other will be used. The control is at the left side, this being especially adapted for service in traffic. At

either side of the body, back of the seat, are installed side lamps, while on the dash is carried another set. They are all oil-burning. All of the fittings are nickeled, that being more in keeping with the service for which the wagon is intended.

The absence of running boards, the short fenders and the single stop at the side, with the muffler carried crosswise back to the dustpan, impresses one as being odd, but there is nothing unsakity in the appearance of the chance while the body is thoroughly commendable from every point of view.

WHITE ENGINEER STUDIES FOREIGN CABS.

M. F. Melhuish of the White Company, Cleveland, O, recently returned from a tour abroad, during which be visited all the principal European cities for the purpose of studying the construction and plan of operating motor driven public service convergences. This concern has amounted its intention of making the production of taxicaba and motor buses a definite part of its business a definite part of its business.

Mr. Melnuish states that in London alone there are 7200 attactions in daily operation, but he would not venture to estimate the number of motor buses there. The motor practically had displaced the electric street car in that (12). The General Omnibus Company, one of the largest concerns in London, has its own factory where it makes its cars complete, producing at least 20 cars weekly and utilizing all of its product on its own lines within the city.

He holds that one of the chief reasons why taxinabs are so much more common in Kunquean cities than in America is that it costs only a fraction as much to ride in them there as it does here. In Landon, the fare for riding in a motor bas is twopence, or four cents in American money. No transfers are given and if a passenger wishes to trave beyond the cold of any particular line be must pay an additional fare.

The type of motor 'bus used in London is very similar to the double-decked vehicles which are so familiar as a part of the traffic on Fifth avenue in New York City. Each is marked to denote the territory it covers, much the same as our street cars.

The rider in a taxicab in London pays only 16 cents for the first haif-mile and four cents for each additional halfmile. This explains the otherwise amazing fact that there are 7200 taxicabs in that city.

Most of the London cabs are equipped with four-cylinder engines because of the hills in some districts, but in Paria where the streets are almost invariably level, the vehicles have one and two-cylinder engines. To the American eye, the London taxicabs are much more sensible than those of Paris and other European capitals, where the body design usually seems "freakish."

The London branch of the White Company is reported as thriving. It will surprise many people to know that it employs 300 men in its factory department. When White cars are sold in Europe, the bome office ships the chassis only to its London branch. There they are fitted with bodies conforming to the style suitable for that particular section in which the car is finally to be delivered.

FIRST AMERICAN-BUILT COMMER.

The distinction of purchasing the first Commer truck made in this country by Wycoff, Church & Partidge, Inc., of New York City, belongs to the Easte Storage Warehouse of Brooklya. This concern already has one Commer, imported by the American agent last summer, and it has been doing nuck good service that a repeat order was given for the first vehicle produced by the new factory. It will be a duplicate of the English product, all the ligst, tools, dies and patterns having been imported for this purpose. It will be of the 4.5-ton capacity and fitted with the regular van body. The American product will be designated as the W. P. C. Commer. The Boston agent has claimed the second machine.



BRIEF NEWS OF MANUFACTURER

- AND THE TRADE -

The Mogui Trock Company of Chicago was incorporated recently for \$125.800. The incorporators include G. C. Griffiths, J. S. James and F. Rawson,

The Motor (ah Company of Hosion has been incorporated for \$1400. Otto A. Lawton of 21 Irvington street, Hosiun, is named as president and treasurer.

The M. & P. Electric Vehicle Company was incorporated in Detroit recently for \$10,000. Myron C. Messiman and Burton Grandy ore named among the incorporators.

The Wishart-Dayton Acts Track Company of New York City has been incorporated for \$25,000 and the incorporators include R A. Inch, S. E. Wishart and J. B. Smith.

The Electric Motor than Company, recently urganized at St. Louis, Mo., will handle electric commercial vehicles equipped with the Walker balance gear drive.

The Federal Motor Cae Company, Chicago, has been incorported for \$10,000, the incorporators including C. W. Rhodes, David B, Rosenthal and Leo S, Kositchek.

The tmaignmated Motors Company, Los Angeles, Cal., was incorporated recently for \$500,000. The directors named are

The Motor 'Bus Company of Chicago has been incorporated for \$60,000 and will operate and maintain motor 'buses. The incorporators include Clarence E. Morris and Frank P. Page.

The American Silent Motors Company was incorporated at Los Angeles, Cal., recently, for \$2,089,000. The directors named include Henjamin Waterfall, R. J. Connors and Ernesi Kouwen-Hoven

The Hoyal Automobile Machine Company, Brooklyn, N. Y. has been incorporated for \$10,000. The incorporators include Sydney Solomon, Cella Rothstein, Louis B. Brodsky and William M. Abel.

The White Garage Corporation, Los Angeles, Cal., has been incorporated for \$100,000. The incorporators named are: F Ray Sibley Martin E. Tew, R. Roy Sibley, C. M. McCully and E. L. Sibley.

The Batavia Company of Pennajivania, New York City, has been incorporated for \$30,000, and the incorporators named include II. W. Newburger and M. Lustig of that city, and D. Welss of Yonkers.

The Kinsel Kar Vew England Branch has moved to 10 Columbus avenue, Motor Mart, Park square, Boston, These quar-



Three-Too White Truck, a Festare of Parade Held Reccotly in Honor of Opening of a New Bridge at Pitinborg, Peop.

as follows: C. B. Croner, C. J. Schroeder and J. L. Kirkman.

The Boffalo Motor Vehicle Service Company, Buffalo, N. Y. has been capitalized for \$100,000 with the following incorporators: W. B. Huntley, J. H. Vall, C. B. Huntley, J. H. Vall, C. B. Huntley.

The B. Geedelman Maonfacturing Company, St. Louis, Mo., has moved into new quarters on Washington avenue, near Waston. The new building was completed recently.

The Wachmett Cab & thiomobile Company, Kittery, Me, was incorporated recently for \$5000. Horace Mitchell is named as president and treasurer, and C. E. Smothers as clerk.

The Motor Accessories Manufacturing Company, Marshalltown, Ia., has been incurporated for \$19,000, the (occuparators) neturing Charles C. Ediridge and Edwin J. Beebe.

The L. S. Mitchell Company, Jacksonville, Fla., has taken the agency for the Payton truck. W. A. taxter, special factory representative, visited the new agents recently.

Frank 4. Bahcock of the Bahcock Electric Carriage Company, Buffalo, N. Y. was a visitor in Boston recently, where he was entertained by the Electric Vehicle Club of that city.

William C. Durnot was given a banquet recently by the business men of Flint, Mick, in recognition of his making that city one of the leading automobile centres of the country ters will be occupied until spring when the new building will be completed.

The Goodyear Tire 4 Rabber Company, Akron, O., has removed its 8t Louis. Mo., branch from Olive street to Locust. The new building is one of the most complete of its kind in the Southwest.

The National Spring Tire Company, Chicago, was incorporated recently for \$125,000. The Incorporators named include Charles L. Sigmann, Jr., Louis Valence, Charles II. Jackson and P. J. Karasek.

The Boolevard Company, Waterhury, Conn., has been incorporated for \$5000. The officers consist of: President, William E. Russell; the president, Lizzle M. Russell; treasurer, Albert belay; secretary, Charlotte M. Delny,

The Kropp Motors Company, Wilmington, Del. has been incorporated for \$259,909 and will manufacture motor vehicles and parts. The incorporators include D. Morgan, G. H. Anderson and James McMorran, all of Pittsburg, Penh.

The Slover-Lang Company of Boston has been locorporated for \$10,000 to sell speed and mileage meters. The directors are: President, George II Lang. Breakfur Charles L Stover, 221 Columbus avenue, Boston, and Norman F Prutt.

Col. Grantley P. Postles has lessed the garage and show rooms at 220 West 16th street, Wilmington, 1stl. and will had-

Dia was by Google

die commercial and pleasure vehteles. Henry G. Kurtz, agent for the Mack truck, will be associated with Mr. Postles.

The Antocar Sales & Service Company of Philadelphia, will establish a branch at 714 Orange street, Wilmington, Del. where a full line of commercial vehicles will be carried and a service station maintained for the users of Autocars.

The Atlantie Auto Track Transportation Company, Haverlill, Mass, has established quarters at 54 Water street and will conduct a general transportation business. One machine is now in service and the addition of others is contempiated

F. M. Quick, formerly with the Gibson Auto Company, Indianapolis, Ind., and the United Motors Indianapolis Company, has joined the sales force of the Findelsen & Kropf Manufacturing Company, Chicago, maker of Raylield carbureters.

Brant L. Egan has resigned as advertising manager of the Motor Car Equipment Company of New York City and will hereafter devote his energies to general advertising with the Catalog Publishing Company, World building, New York City.

The Miles Molor Tire Company, capitalized at \$200,000, has been organized and will erect a plant at Brasilock, Penn The incorporators are: Charles W. Bressler, Thomas C. Aten, Charles L. Balyser and Zenab A. Delwaris, all of Brasilock, Frederick Miles and M. B. Myers.

George L. Suilivan, recently antomobile editor of the New York Tribune, has judged the sales department of the American Locomotive Company, New York City, and will be associated.

Ham R. Bush; vice president, Cecil 44, Fennell secretary, F. J. Bush, treasurer, Knox Tuneding

The Virginia Automobile Garage A Hepair Company, Norfolia Strambar and American Strambar and S

The Veile Moury Achiefe Company's Chicago branch has closed a contract for the sale of Veile commercial and pleasure vehicles with the teluluntia Garage, 225 West Madison street, Chicago. The latter will operate a service stalin for the benefit of the West Side trade, and will work in conjunction with the Chicago branch at 1615 Michigan account.

The Reny Electric Company, Anderson, Ind., naker of kindtion and Bubling devices amountees the absorption of the American Headlight Company and also has purchased outright air parents, declars, good will and manufacturing eights of the Peters Electric Headlight for steam becomotives. New buildings will be errected at Anderson to care for this produc-

A White three-ton truck much by the White Company, Cleveland, O. was one of the features of a street parade held excently in Piti-storic, Petal, to celebrate the opening of the new Sewickley helder. The machine was attractively decorated, as indicated by the accommunitying ulmeration. It was entered by the Jacoph Herner Community, Twiche other White automo-



Salesmen Representing the Inicrests of the Baker Motor Vehicle Company Who Attended Convention at the Factory of That Concern Recently,

ciated with Harry S Houpt, manager of the Alco branch in that city

The Parker Motor Wagos Company, New York City, has been incorporated for \$10,000 with the following named as incorporators: Hurry C. Cottfried, Prew McKeinin and Charles E. Wood, 605 West 14th street, New York City.

The American Adjustable Wheel Company, Iac., Richmond, Va., was Incorporated recently for \$400,000 and will manufacture an adjustable motor car wheel. The officers named are: President, R. H. Bruce; vice president, Clarence Vaden; treasurer, J. H. Pinner; secretary, J. C. Davis.

The Merchants' Auto Company, Indianapolis, Ind. announces a healing in its garanes. The Delaware street quarters will be utilized for commercial vehicles while the repair shop and battery charging station will be located on Frat street. E. Frank Brown lins succeeded It. B. Stout, Jr., as manager.

Bosch magnetos, made by the Bosch Magneto Company, New York City, were well represented at the Olympia show, held in London, England, recently. According to the company, of the 528 magnetos shown 188 were Bosch, 81 per cent, of the total. The inflames of 19 per cent, was divided among 18 other makers.

The Mack Motor Truck Company of St. Loals, Mo., has been organized and will act as distributor for the Middle West for the Mack Bros. Motor t'ar Company, Allentown, Penn. The officers of the new company are as follows: President, Wil-

E. P. Gorton, who was recently appointed manager of the United Attanta Company, Allanta, Ga., seuthern branch of that division of the United States Motor Company, has been prominently identified with the Maxwell organization since 1901. He went to Atlanta from Syracuse, N. V., where for the past three years he has been manager of the branch in that

The Baker Water Vehicle Company of Civeyland, O., held a convention lately attended by commercial our salesmen from various rise distances from the convention of the convention of the convention of the different problems which confront salesmen in the commercial car field and another to inspecting the factory. In the accompanying infortant problems which confront salesmen of the party at the

C. P., spittderf, New York City, maker of Spittderf magnetos, has been making extensive alterations and changes in the branch houses of that concern throughout the country, these bring necessary by the increasing basiness. Pollowing these bring necessary is provided by the property of the property of the provided provided

Digital by Google

DISCUSSING ANTI-FRICTION BEARINGS

Mr. Thomas Takes Exception to Some Statements Made by Authors of Previous Article--Mr. Page Makes Reply, Answering All Criticisms.

N THE December issue of MOTOR TRUCK there appeared an interesting discussion on the use of anti-friction bearlngs for worm gearing by Victor W. Page, M. E., and A. F. Rockwell of the New Departure Manufacturing Company, Bristol, Conn., concerning which H. Kerr Thomas of the Pierce-Arrow Manufacturing Company, Buffalo, N. Y., appears to take some exception. Desiring that the authors of the article in question should have full opportunity to answer Mr. Thomas, his letter was forwarded to them. The entire correspondence is presented herewith, and it is believed that the readers of MOTOR TRUCK will find the continuation of the discussion quite as interesting as the original

Editor MOTOR TRUCK

Sir With reference to the interesting article an anti-friction bearings for worm genting appearing in the 1-becember num-ber of the Mattell Till'CK. the author raises one or two points which, I think call for some criticism in the first place, he haves a number of arguments upon the

statement, "The lower the pressure the more efficient the

the thrust in either discrition at one end only and is consequently free to expand as much as necessary.

I have not any experience myself with the special form of combination hall bearings described in the article but their would be almost a forexone conclusion II they were only provided of such strength as would be proper for the food-

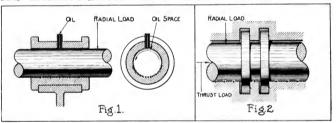
provided of such strength as would be proper to the mentioned in the article.

I trust that some further information on the points raised may be furthcoming from the author.

Yours truly. H. KERR TROMAS, A. M. I. MECH. E. Buffato, N. Y. Dec. 13

Editor MOTOR THUCK

I beg to acknowledge receipt of your communication of recent date with enclosure and desire to thank you for giving recent data with enclosure and desire to thank you for sixting are present in the hind of Mr Thomas, t believe that a more careful reading of the article in question would have eliminated some of the criticism which Mr Thomas offers The statement to which he seems to take specific properties of the more castly indication, can be maintained. There is also more castly indication can be maintained. There is also



Demonstrating Different Conditions Which Prevail to Oiling Journal and Collar Bearings-Vote Hiffenlty in Forcing Oil
Film Between Sorfaces of Thrust Collars Which Are Reid Tightly Against Corresponding Paces of Bushing.

accepted with regard to friction. Unwin, basing his arguaccepted with reward in friction. Pawin, basing his argu-ments on the mass of data otherined by what are known as the Beauchamp-Tower experiments of the Institution of Mechanded Engineers, established the Company of the Company of the Engineers of the Company of the Company of the Company proportionate to the square root of the rubbing velocity and inversely as the bearing pressure. In other words, when the bearing pressure is increased, the con-efficient of friction falls as it also does when the speed of the rubbing surfaces.

t'oming to the calculations affecting ! I regret that I cannot follow how some of the results are ob-tained. The final figures with regard to the pressures on the talized. The final fixures with regard to like pressures on the worm teels are much lower than anything t have ever come across. Thus the load on the worm teeth in the examples the author quotes is given as 228 pounds. This should be in my opinion, very much higher and if the earlies at 4.5 horse-power, which the author refers to, is exerting the full sower. it should be sufficient to skid the wheels of say a fully loaded five-ton truck, and the load will be nearer to 38,000 pounds

It is possible that I have misread some of the figures in the article but as others may do the same, it appeared de-sirable to ask your correspondent for some further information

as to how his figures are obtained With regard to the method of supporting the worm the examples given in Figs. 2, 3, 4, 5, 6 and 8 in the becomber issue of the MOTOR THICK, are all undestrable. No worm grar has ever been constructed which will work without some gear has ever been constructed which will work without some rise in temperature and the elimpation of the work spindle half races unless they are assembled in the first place with a manual of lock lash which would be fround highly objection, able. The examples kiven in First 7 and 9 in the same issu-are correct but in this respect, as the spindle is held against less throat on the hearings and consequently less hower consumed by friction'

The argument which Mr Thomas uses to support his con-tention is taken from data which has been accepted by many engineers and which holds true only when speaking of journals which are operating under ideal conditions as regard which are operating distributed to the regard units after all on. I for reduces the quantity or certainty of lubrication, one will obtain radiculty different results, as will be evidenced by the accompanying table which was compiled from the same Beauchamp-Tower experiments in which Mr. Thomas seems to place so much reliance.

Oll Feed, drops per min.	Co-efficient of friction 10s	Load, oper so, hiel
	160%	20
92	1417.7	0.0
5,11	48.5.3	6.0
4.1	2, 41-19, 2	9.13
5 %	0.077	2 4149
3.6	6052	120
20	100.74.3	1.10
4.5	.0113	160
	pa - 1 44 = + 2	260
i	Per Land	240

Table Taken from Beauchamp-Toner Experiments with Platu Collar Thrust Bearings Which Remonstrated Gradoni Fric-tion-Coefficient Increase with Augmenting Pressure at a Rotative Speed of 128 Revolutions a Minute with Acarty Constant Lubrication,

If the paragraph in question is read closely it with be evident that It related to litrical under and bearines and in speaktill group, including worm, worm wheel, and supporting beartime, Tency, including worm, worm wheel, and supporting beartime. The relational loss for well lubricated journals must governing the action of dry, semi-dry or even surfaces between which lubrication is uncertain. It is difficult for one ends. The laws upon which operation of the Journal bearing depend cannot be applied to those of the step or coller type journal hearing the friction resistance must obviously conform to the laws of judricated ourfaces, on the other hands for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conform to the laws for dry or unbestioned with the conformation of the condent of the conformation of the contraction of the conformation of the contraction of the contraction of the con-

Between two extremes is the condition of uncertain lubrication and this is the one in which warm beginning must offer run, when the worm is placed at the top of the rear axis bousting. It is proceed to the top of the rear axis bousting to the process of the process of the state of the adversarial to the state of the state shafts as its most common placing is directly on the rear axis learning to the short of the state of the adversarial to the short of the state of the adversarial to the short of the state of the state

maintained, thus and introd to the lower with Mr. Thomasbarmon re-production in lower of friction but all the same time it
will be evident that worms can not always work under feel
condition. In sainting that lower pressures make for greeter
will be evident that worms can not always work under feel
conditions. In sainting that lower pressures make for greeter
of maintaining an anti-friction oil tim between the surfaces
of maintaining an anti-friction oil tim between the surfaces
of the worm tensor to the through bewrither if of the plain collision
that the was the type that the writer demonstrated would
consume considerable power. If bearings of this kind are used
and if the pressure is unduly high it would be difficult to
maintain a unificent supply of oil between the surfaces. If
the oral that any bearing will be practically in metallic
contact with its journal Lower these conditions. It coefficient of friction would be nearly than of the day and the
time of the condition of the conditions. In the
condition of the condition of the condition of the
condition of the condition of the condition of the
condition of the condition of the
condition of the condition of the
condition of the conditions of the
condition of the condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condition of the
condit

There are certain pressures at which any oil tim will tend to break down and obviously, bubrient eating the Introduced between beginn surfaces if the College of the Colleg

Let us see how authorities look upon such hypothesis as formulated by my critic. Afford, in his book, "Bearings and Their Landreatina", says the following in regard to the friction Their Landreatina", says the following in regard to the friction for a colair bearing is higher than a journal bearing ranning under similar conditions. In such bearings there is little on on action bearing the little of the properties of the colair bearings and the colair bearings approaches that of a journal bearing running at low velocity and with poor lubrication. It may be taken as 4 to indigenteent of the speed of ruthing and accreases with an increase of load. This inter hears out Mr. Thomas statement but note how it is qualified. Assum quoting Mr. Alford paralley) how pressure and comparatively not pressure and comparatively for resistence are separated by a film of oil maintained by forced or problitting balance balance by attains to balance where collent type throat stained by forced or problitting balance was collent type throat stained by forced or problitting balance was cellent type throat.

The condition which actually obtains when cellar type thrust hearings are used can readily be compared in time which exist a series of the compared of the series which exist sketch Fig. 1, herewith, it will be seen that under a radical load, a shaft ranning in a plain bushing will be thrust against the bottom as indicated by the cineses. As all such business that the cells of the cineses are all such business will be that the will be evident two there exists on the unloaded side an amount of space which will permit oil to feed constantly acting the bearing surface. The total into the substantial acting the bearing surface. The total into the substantial maintain an oil film at the points where the load is upplied. Let us compare these conductions with the operation of a collar type throat bearing as shown at Fig. 2. Here we see that under the Influence of the throat load the faces of the collars are breased thirthy against the corresponding steps in collars are breased throat the collars are breased throat the collars are breased to collars and the collars are breased to collars and the collars are breased to collars and the collars are breased on the collars are breased to the collars are collars and the collars are the collars are collars and the beat quantity to the collars are collars and the beat quantity to the collars are collars and the beat quantity to the collars are collars and the tool quantity the collars are collars and the collars are collars are collars.

as the hood upon the bearing augmented. If Mr. Thomas will carefully another the foregoing argu-II Mr. Thomas will carefully another the foregoing argujustified in as much as he attempted to apply ideal conditions and the state of the state of the state of the state of the foregoing of the state of the state of the state of the foregoing of the state of the state of the state of the faces in contact and II will be difficult to involve more oil to replace that used up. If one refers to the table presented to replace that used up. If one refers to the table presented contact and the state of the state of the state of the variance around had can be applied to cannot the bearings to writers contained that it is over unit pressure sets make for inwither a contaction that the lower unit pressure sets make for in-

selfer it is made nepoles wit securing proper interestion the crease effective is founded on facts. Possibleting next Mr. Thomas criticism of method of mannings which were recommended as giving the best results were Figs. 8 and 8 in the becomber lease of Mr. Thirty, Mr. Figs. 8 and 8 in the becomber lease of Mr. Thirty, Mr. Figs. 8 and 8 in the becomber lease of Mr. Thirty, Mr.

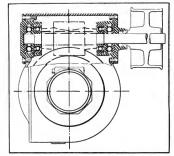


Fig. 3-Typical Design of Worm Mounting, Showing Conventional Combination of Thrust and Hadial Bearings.

means. In some cases, however, the explanation due to the heating which usually obtains a since properly constructed worm consists of the property constructed worm of the property constructed worm of the property construction of the property of the mounting shows at Fig. 6. In the article previously published, which Mr. Thomas extitledes, is similar to that used by a maker win has had much experience with worm drive, company with whom the writer is sufficient A. Fig. 2 here with its presented a mounting taken directly from a leading provision is made for worm extension, instanton in which med for worm extension,

provision is made for worm extended, the artial exponsion would be. Assume that we find a sized worm one foot in length and that friction would produce a rise in temperature would be desirable to have each at a language test in maximum degree of heat at which even perfectly lightenied bearings parsion of steel to be somethis line ha much length a degree Fahrenheit. This would indicate a total expansion of 10 fach, condition and a sized of the sized particular of 200 degrees between the goest and the hursday and the light and the light and the light and the light and the sized particular of 200 degrees between the goest and the hursday and the light and light and

In view of what has been demonstrated it would seem Its view of what has been demonstrated it would seem that the mounting of double row bearings described in the criticised article is not wrong and there can be but little ques-tion about their desirability. It has been shown that white worm expansion under ordinary conditions is slight it would be well to make provision for some slight degree of increase in unit length of the worm shaft. This can be done very sailsuntil length of the worm shaft. This can be done very sails-factorily by using the tunning suggested at Fig. 2. Even in the case of Fig. 3, where two double row hearings are used, one at each end of the worm shaft, it will be evident that with a maximum clearance space or "float" of 905, link or even dou-ble that amount between the chomping and and the hearing at the that amount between the economic and the leading at wheen the bearing parts because it is a unit construction. Under this condition of mountind any increase in leukit due to worm expansion would be easily laken even the leading to the con-trol of the control of the control of the control of the con-not follow fully the line of reasoning which shows end threat pressure lower than his knows of the load that exacts on its results.

pressure lower than his suggested in 100 reason to wheth, which he places at the moderate 22 amount of 30,000 pounds. With reference to this the writer can only say that the formulae have been taken from standard authorities and as values are given and the equalitions worked out it would seem that any one could follow same without a burdensome expenditure of thought.

expenditure of bought.

Mr Thomas assures the writer that while he has had no
Mr Thomas assures the writer that while he has had no
ther would surely fail if selected with reference to the toads
mentioned in the article. Let us see how this works out by
considering some typical hearings which would be udequate to
considering some typical hearings which would be udequate to
Take the meanings through the stated or 12-be pounds which
is given when the gesting is in the reverse ratio and the full
of the change upsed mechanism is being delivered to the worm
If one selects a collar hearing of the hall type from vandard
tables in resist this load at 25 receditions a minute, one will If one selects a collar hearing of the half type from standard find it necessary to use a hearing of 155 inches here using 155-inch halfs and having an outside diameter of four inches triest and that it must be used in concerning all a selections and a selection of the selectio

Praismit 40 horsesower without much danger of capture. As-suming that in tisek we keen wends girl r a bearing of the beary series, a No. 41 which has the same hore as the No. 311, but uses larger halfs and which calls for a housing hav-ing a hore of \$5118 (seles or 149 mm, could be utilized to ad-vantage. This would provide a factor of safety that would be desirable

be desirable. At the other hand let us consider the thrust load at 30.000 pounds, which Mr. Thomas evidently believes to exist, according to this own statement, and figure a hearing size to resist same by using standard formula. One will find that a collar thrust hearing about seven inches bore, is inches in dismeter. hrush bearing about seven inches bore, is inches in diameter withhird to a similar to the control of the contro ute would be of such size to tax the ingenuity of a designing engineer, to install at any other point except the load carrying platform of the truck uoder discussion.

If Mr Thomas prefers plain thrust bearings of the collar type.

which by his own statement, have less friction and conse-quently longer life the more load one puts on them, he will find, assuming a maximum permissible had of 200 pounds a find, as-uning a maximum permissible load of 300 pounds a square into projected bearing area, final it would take collist square into projected bearing area, final it would take collist of 20,000 besseds. Taking a typical example to show the ab-suality of such a statement II would mean proxising a series of five eight-inch diameter collars on a six-inch shaft, and paper and reference to a few formulae and tables readily ac-cessible to any one of an inquiring nature would have navel Mr. Thomas making some sixtenness regarding badds or fricts.

Mr. Thomas making some statements regarding loads or friction which are founded on sulfite refrection that, obviously thank Mr. Thomas for his criticism of the article, but feels thank Mr. Thomas for his criticism of the article, but feels an intelligent understanding of the statements made therein, the Lawring thank Mr. Thomas for his criticism of the article, but a lawring that the statement of the article is a statement of the article in the statement of loads existing under the conditions saided are radically wrong in proximations and may vary by small amounts from stresses which will be statement of the statement of loads existing under the conditions saided are radically wrong in proximations and may vary by small amounts from stresses which will be statement of the state

which will actually exist at the point specified. Trusting that you will find space enough to publish this somewhat lengthy exposition which should answer Mr. Thomas criticisms fully enough so he may obtain a better understanding of the subject under discussion. I beg to remain, Yours very truly

VICTOR W. PAGE, M. E.

Bristot, Conn., Dec. 26.

CALENDAR OF COMING EVENTS.

January, 1912.

(New York Shows)

Jan. 2-9 -- Importers' Salon, Hotel Astor.

Jan. 6-13 Pleasure cars, Madison Square Garden.

Jan. 10-17-N. A. A. M., Grand Central Palace.

Jan. 15-20-Commercial cars, Madison Square Garden.

Jan. 8-13-Show, Peorla, Ill.

Jan. 13-19-Show, Milwaukee, Wis. Jan. 13-20 Pleasure car show, Philadelphia, Penn.

Jan. 15-20-Show, Toledo, O.

Jan. 15-20-Show, St. Paul, Minn.

Jan. 18-20-Annual meeting S. A. E., New York

Jan. 22-27-Commercial car show, Philadelphia, Penn.

Jan. 22-27-Show, Detroit, Mich.

Jan. 22-27-Show, Rochester, N. Y.

Jan. 22-27-Show, Hubuque, la.

Jan. 22-2x -- Show, Providence, R. 1

Jan. 27-Feb. 3- Pleasure car show, Chicago, Ill.

Jan. 27-Feb. 3- Pleasure car show, Pittsburg, Penn.

Jan. 29-Feb. 3 - Show, Scranton, Penn.

Jan. 29-Feb. 3-Dealers' show. Minneapolls, Minn.

Jan. 29-Feb. 3. Show, Montgomery, Ala.

February.

Feb. 1- 7-Show, Washington, D. C.

Feb. 3-10-National show, Montreal, Can.

Feb. 3-10-Show, Harrisburg, Penn.

Feb. 5-16-Commercial car show, Chicago, III.

Feb. 5-10 Commercial car show, Plitsburg, Penn. Feb. 5-10-Pleasure ctr show, St. Louis, Mo.

Feb. 5-10 Show, Buffalo, N. Y.

Feb. 10-17 - Show, Atlanta, Ga.

Feb. 12-17 -- Commercial car show, St. Louis, Mo.

Feb. 12-17-Show, Memphis, Tenn.

Feb. 12-17 - Show, Ottawa, Can.

Feb. 12-17-Show, Fall River, Mass.

Feb. 12-17-Show, Kansas City, Mo.

Feb. 12-19 Show, Dayton, O.

Feb. 14-17-Show, Grand Rapids, Mich.

Peb. 17-24 - Exposition show, Pittsburg, Penn.

Feb. 17-24 - Association show, Minneapolis, Minn.

Feb. 17-24 Show, Newark, N. J.

Feb. 17-24 Show, Cleveland, O. Feb. 19-24 Show, Omaha, Neb

Feb. 19-24-Show, Hartlord, Conn.

Feb. 19-24 Show, Cincinnati, O.

Feb. 20-24 Show, Blaghamton, N. Y.

Feb. 20-28 .- Show, Italiamore, Md.

Feb. 21-24 Show, Louisville, Ky.

Feb. 21-28-Show, Toronto, Can.

Feb. 24-March 2 Show, Brooklyn, N. Y

Feb. 26-March 2-Show, Paterson, N. J.

Feb. 26-March 2-Snow, Elmira, N. Y.

Feb. 28 March 2 Show, Davenport, la.

March 2.9 Show, Nortolk, Va.

March 2-9 - Pleasure car show, Boston, Mass March 4-9 - Show, Des Molnes, la

March 4-10 Show, Denver, Col.

March 6-9 -Show, Tiffin, O

March 12-16 -Show, Syracuse, N. Y. March 13-20-Commercial car show, Boston, Mass.

MANY CITIES ADOPT WHITE 'BUSES.

That there is a growing tendency to adopt motor propelled omnibuses is evidenced by the announcement that teries a Salom, made by the Niagara Lead & Battery Com-

Indianapolis, Ind., has opened a line of machines and that a company has been formed in Kenosha, Wis., for a similar purpose. In the former city the Rapid Transit Company has placed in service several vehicles of the same type as utilized by a Chicago concern. These are the product of the White Company, Cleveiand, O., and the chassis is of the 1.5-ton class. These machines seat 18 people and all are of the payas-you-enter type. They are fitted with electric fans for summer and a heating system is employed in the winter. The sents are luxuriously upholstered and the interior of the car is lighted by electric dome jamps

In the accompanying illustration is presented one of the automobiles which is proving a great convenience to the residents of Meridian street, Indianapolis, over which thoroughfare the operation of street car lines is not permitted, There are many fine residences on this street and the residents their own vehicles. The 'huses will

operate over a territory within 3.5 miles of the "circle." the centre of the city. The cash fare charged is 16 cents or four tickets for 25 cents, 10 for 50 and 21 for The company behind the enterprise has ample capital and intends to establish more White cars for service in various parts of the city.

The Kenosha corporation, which will utilize White vehicles to supplant the service of the Kenosha Rallway, has decided upon the following schedule: Ten cents for a single trip over the entire line now mapped out. Ten tickets will be sold for 75 cents and 50 for \$2.50.

SPLENDID TIRE MILEAGE.

J. J. Boohar, secretary of the Terminal Taxical Company, Washington, D. C., writes enthusiastically concerning a 34 by four-inch Republic tire, made by the Republic Rubber Company, Youngstown, O., which recently was taken from one of its cars. This shoe was fitted to a machine weighing 2800 pounds and was operated 9744 miles on the left rear wheel before being shifted to the right front wheel for 576, a total of 10,320 miles. From the time it was instailed, June 24, 1910, until it was discarded. Oct. 1, 1911. it was removed only once for repairs, May 30, 1911, when an inside fabric patch was applied at a cost of \$1.80. This tire cost the company less than four milis a mile of service.

SALOM BATTERY WINS.

in competition with three other makes of storage bat-



are obliged either to waik or use Type of White Pay-na-hou-Enter Motor Bus tdopted by Transit Lines Established to

pany, Niagara Falis, N. Y., won out in a trial for electric lighting the 105 taxicabs of the Taxi Service Company, Boston, Mass., recently. The average time of the test for four cars on two side and meter lights, making 14 candlepower in all, was 60 hours. The contract was made with the Salom Battery Company of New England, Boston, Mass.

TRUCKS AT MILWAUKEE SHOW.

The committee in charge of the show of the Milwaukee Automobile Beniers' Association in the Auditorium, Milwaukee, Wis., Jan. 13-20, has spared no pains to make the commercial vehicle division even more attractive than that section devoted to pleasure cars. The event is in charge of F. J. Edwards as chairman of the committee, and B. J. Ruddle as manager. Among the exhibitors of business automohiles will be the following:

Buick Motor Company, American Automobile Company, Hickman-Lauson-Diener Company, Kissel-Kar Company, Curtis Automobile Company, Bates-Odenbrett Automobile Company, Packard Motor Car Company, Johnson Service Company, Orin R. Hughes, Brodesser Motor Truck Company American Locomotive Company, Crown Commercial Car Company, McDuffee Auto Company, Stegeman Motor Car Company, B. F. Power Company, and Universal Machinery Company.

ADVERTISING INDEX Accessory & Garage Journal. Marburg Bros. McIntyre Company, W. II Mon Magnoto Mea Magneto Mear Tire & Rubber Company Perfection Spring Company Republic Rubber Company Couple-Gear Freight-Wheel Company. 18 lecentur Moior Car Company. 12 Edition Storage Hattery Company 6 Edition Storage Hattery Company 6 General Moiors Truck Company 6 General Vehicle Company Cover Hazard Moior Manufacturing Company. 2 Cover Simms Magneto Company . . United States Tire Company.... Victor Motor Truck Campany Hoffnung & Ca. 8. Ltd Kinster-Bennett Company Knox Automobile Company Walker Machine Company, G. A. Western Motor Company Mais Motor Truck Commany. White Company, The ...

Devoted to Motor Driven Business Vehicles of All Classes.

VOL. III.

PAWTUCKET, R. I., FEBRUARY, 1912

No. 2

TWO BIG SHOWS IN NEW YORK CITY

Madison Square Garden and Grand Central Palace Displays Reveal Much Progress-Trend of Design Is Toward Accessibility, Economy of Operation and Refinement-Splendid Business Results at Both Exhibitions.

ROGRESS in motor truck construction evidently is to be a matter of strengthening those features which may be regarded more or less as standard, rather than in radical departures from established design. This applies more particularly to the mechanical details. aince it seems to be settled that the working out of hody problems must be along individual lines. There are a few things, concerning which designers and constructors may he expected to disagree for all time, and no doubt this difference of opinion will extend to the purchaser and user as well Much that has been determined in the pleasure car

field has been adopted and enlarged upon in the industrial transport of today. Taking the subject as a whole, it was not to be expected that the national commercial vehicle shows in New York City would disclose any great number of features which were decidedis new.

A year ago business vehicles, or freight automobiles, were called specifically to the attention of the public for the first time in a separate show. The production of this line was regarded as in its infancy at the time, and some doubt was expressed as to the wisdom of the departure. itut despite the fact that the importance of this branch of the in-

under-estimated, the display in 1911 was sufficient to indicate that much progress in order to be certain of the use of six. This percentage had been made.

Compared with the product on view a year ago, the industry has made rapid strides during the twelvemonth. Several new vehicles were shown for the first time, some of these being manufactured by concerns which have long been associated with the pleasure car line; others were new models brought out this season by well known truck makers, while still others were shaointely new, their aponsors never having made display in either field previously. be stated at the outset that the mechanical construction was uniformly superior to that of 1911, greater attention having been paid to so-called minor details; matters of design, workmanship and finish. This applies to the two exhibits as a whole, and not in any individual sense.

Having special reference to the chassis; Two or three features stand out rather distinctly, as indicating the trend of design. Accessibility to the power plant, carrying with it the location of driver, may be regarded by some as of greatest importance. The fitting of a governor, thereby taking the matter of speed regulation beyond a certain point, out of the hands of the operator, evidently has been se considered by many makers. But from the standpoint of

the purchaser who destres to utilize trucks in fleets, replacing his horse drawn coulbment entirely, the provision for the substitution of an extra power plant has a most direct appeal. The latter feature may be regarded as the chief innovation at the shows, aibeit the designs of those on display were made pulslic some months since.

It is well known that concerns which must depend upon horses for their delivery systems or haulage work are required to keep a number of extra animals in order that there shail be no loss of efficiency because of indisposition or death. One well known departn:ent store in New York City considers it

dustry was somewhat hints Floor of Mudicon Square Garden During Second Annual Exclusive Comnecessary to keep a ratio of seven horses may be accepted as an average, although it may be regarded as too large in some cases and too small in others. whatever the number of extra animals, they must be fed and housed as well when not working as when employed;

an ever present source of expense With this latest plan of the truck maker, the owner of a fleet of commercial motor vehicles simply buys an extra power plant, which can be slipped into place instead of the disabled motor within a few minutes, hardly more than it would take to change horses, and the garage attendant



mercial Vehicle Dispiny,

its work. The advantages are obvious. There is no delay in the delivery system, and the extra horse, if it may be so termed, eats nothing -- costs nothing - while it is awaiting its turn to be useful.

This is accomplished in a number of ways, as always has been true. But special reference is made here to the simplification of the removal and replacement evidenced by the latest designs of some of the makers. These methods will be described in detail in connection with the review of the various exhibits on the succeeding pages. And it may be added the feature is confined to the power plant, but includes transmission units, etc.

In the matter of motor location, opinions still continue to be divided. It is possible that the advocates of the driver over the engine have gained ground slightly. Some of the older and best known firms still retain the hood, but it is noticeable that even with these there is a tendency toward the so-called Continental method in larger sizes. The makers of the Lozier, Locomobile and Pope-Hartford, three established pleasure car concerns which have announced trucks this season, have decided upon the under-the-floor design. In its new six-ton model Knox has gone a step further and placed the driver beside the motor in the cab. after the plan adopted by Morgan, Hewitt and Garford Another feature which may be regarded as a trend of design

is the location of the operating levers. Many concerns which still retain the right hand drive for pleasure cars are producing commercial vehicles with left hand location for the driver, in some instances this means that the levers are in the centre, while in othera a left hand position is provided for these as

Some type of governor is fitted with a large number of makes. This is a new departure, insofar as the shows are concerned, as very few manufacturers had decided upon this a year ago. Self-starting devices also are beginning to make their anpearance although their use is not suf-

tirely proven. It will be surprising, however, if the number were not increased materially during the coming year, as It is known that several makers are working on devices of their own design.

Many of the new machines present features which may be regarded as novel and distinctive. This holds true particularly of transmissions, a number of which must be considered as entirely new although they have been given sufficient test by the makers to warrant their appearance in the market. Last year, the Pierce-Arrow appeared with a worm and worm wheel drive, and the list has been increased by the addition of the Newark and Rowe, although the latter was not shown. Other minor changes will be illustrated and described hereitt.

All told, there were 72 different makes of commercial vehicles represented in the two displays; 35 at Madison Square Garden and 37 at the Grand Central Palace. Of the 72, 12 were operated by electricity, nine of these being shown at the Garden and three at the Palace. Two hundred and forty-two complete vehicles and chassis were displayed, divided as follows: Garden-Gasoline, 100; electrie, 35. Palace-Gasoline, 95; electric, seven.

Of the gasoline vehicles and chassis displayed at the

Madison Square Garden, six were equipped with singlecylinder motors, 19 with two, and 75 with four. At the Grand Central Palace, there were eight having two-cylinder, four-cycle motors; nine with two-cylinder, two-cycle; nine with three-cylinder, two-cycle and 62 with four-cylindor four-ovelo

In the matter of cooling, it was noticeable that in a few lustances those employing air had discarded the system for water, although a number of the new vehicles had selected the air-cooled motor. None of this type was shown at the Garden, while 16 vehicles and chassis displayed aircooled engines at the Palace. This means there were six makes time represented

it has been mentioned herein that body designs are largely a matter of individual application. Naturally, they played a decidedly important part in the display. A visitor at the show might gain the impression at first that the industry was seeking to secure a large share of the brewery and coal lusiness, although, of course, the delivery and general utility wagons far outnumbered the special designs. It is true, however, that brewery wagons and coal dumpers were to be seen at a number of spaces, and some really ingenious devices were included among the latter.

The succeeding pages contain a somewhat detailed description of the various exhibits, affording opportunity to

discuss the new features, both in chassis and body design. Where new models were shown, it has been deemed best to include features which may not be regarded as especially new, in order that the reader may become more or less familiar with the constructional details of these products

With respect to the attendance, it is announced that nearly week devoted to the it is immuselble to determine the exact num-

70,000 people visited the Madison Square Garden during the display of industrial transports Innamuch as commercial and pleasure vehicles were shown together at the Grand Central Palace,

at both displays declare that the business transacted was far ahead of that accomplished along this line a year ago. Owing no doubt to the fact that fewer municipal service wagons were exhibited this year, there was decided decrease in the number of city officials who attended the show. Their places were taken by a largely increased list of farmers, and it was interesting to note how well informed these tillers of the soil were, when it came to dis-

cussing mechanical features of the various cars on display.

Business men in all walks of life were well represented. And with these it is stated that there was a closer investigation of mechanical construction than ever before, although most of them were deeply interested in the body problem. In nearly every case it was found that the inquirer was prepared to huy, providing he could find that which best suited his needs. More real sales and more good prospects than last year, was the chief result of the shows.

As is well known, an effort will be made in 1913 to combine all makes of commercial vehicles in one exhibit, providing a suitable building can be secured, and there is little doubt that this plan will meet with the approval of the manufacturers.



ficiently general to make it appear that Spiendid Setting in New Grand Control Paince, Where Trucks Shared Interest With the Same degree with Pleasure Cure, of accuracy, Exhibitors

EXHIBITS AT THE MADISON SQUARE GARDEN.

WiTH exactly the same decorative scheme as thus which pleased thousands at the pleasure car show in Madison Square Garden, New York City, the previous week, the commercial white manufacturers held their second exclusive display is that historic structure, Jan. 15-20. The event was under the ansightees of the Automobile Board of Trade and the management of the following show committee: More to the second of the control of the Commercial Control of the Management of the following show committee: More to thousand the control of the following show committee:

In the review of the exhibits below, it will be noted that the makes of machines are offered in alphabeitaal order, followed by the name and address of the manufacturer, and the vehicles and chassis on display. No attempt has been made to discuss the offerings of the accessory exhibitors, it being deemed best to reserve this for a succeeding issue; it may be stated, however, that there were 151 representations the state of businesses was much more satisfactory than state of businesses was much more satisfactory than struct during the commercial vehicle show of 1911.

right, and right hand levers. Accessibility is obtained by folding the seat and floor boards in an upright position. No particularly new features were disclosed, the same twocylinder approsed motor and patented double reduction final drive being retained.

Of the body designs special attention was called to the open passenger bus, seating 14 besides the driver. The seats run crosswise, and enclosed doors are fitted on the right side.

trash, tresh Runabout Company, Detroit. Seven hundred-pound chassis and two panel delivery wagons of the same capacity. Motor is in front under a hood, and driver at the left with left hand levers. No new features were presented, the single-cylinder engine with auxiliary balancing device below retained, as well as the unique spiral spring suspension.

Buick, Buick Motor Company, Flint, Mich. Eight different types of bodies on one-ton chassts. Twocylinder opposed motor is located under the floor boards, with driver and levers at the right. The only changes are



View of the Main Hall from the Elevated Platform.

Also, American Lacomotive Company, New York City and Providence, R. I. Two-ton bottled beer wangen, 3,5-ton chassis, five-ton coal dumper. In these the motor is locative to the control of the control of the control of the the right. Accessibility afforded on the right of the conside plates, or by lifting the floor boards. As a feature of refinement, making for sconomy on tires, it is pointed out that the service brake cannot lock the wheels until the speed of the truck has been reduced to two miles an hour. Governers are litted on all models.

The two-ton chassis is claimed to be 21 per cent, lighter than (revious constructions. The lody shown was of all metal, and provided with outrances at the side and rear. The capacity was 72 boxes of bottled beer. The dampling body also was of metal, and arranged so as to dump at the side. The loist was operated on two standards with a succession of gears and by band crank.

Autorar, Antorar Company, Ardmore, Penn. Chassis, station bus, furniture van, casket wagon, enclosed delivery, wire grill, stake and open passenger bus; sil of 1.5-ton capacity. The futor is under the floor, with driver at the General Vehicle Electric Display an Elevated Platform.

such as make for refinement, these including a slightly heavier frame and the adoption of a drop forged I beam section axie, instead of the tubular member offered last

Cartervar, Cartervar Company, Pontiac, Mich Open, grill and full panel bodies on 1500-pound chansis. Two-yillader opposed motor is located under the floor loards, with driver and levers at the right. Radiator is removable from the front, allowing full access to the motor, which may be taken out by loosening a few bolis. Minor adjustments only be made by tipping fact the aluminum footbeard. The transmission, skilled and properly allowed from the company to the control of the control

Flanders, E-M-F Company, Betrott. Chassis and panel delivery waxon, each of 75 pounds capacity. Motor, is located in front under a hood, and the driver is at the right, with right hand levers. This may be regarded as a new product of the Studebaker Corporation, and the chassis is similar in every respect to that of the well known 20 honespower pleasure car, except that if has been strengthened at a number of points to salary if for light delivery work.

Garford, Garford Company, Elyria, O. Chasels, wholesale mlik wagon, wholesale grocery wagon, briwery barrel wagon, all of five tons capacity, and 1.5-ton public service delivery. In the smaller vehicle the motor is located in front under a hond, but in the larger it is in the cab beside the driver. Operator is located at the rich with hand levers. Reddator may be removed and the motor dismontiumay be made without leaving the eath.

The five-ton Garford is an entirely new model, and the 15 and three-ton, the latter of which was not shown, have been changed sufficiently to make them new as well. Heretofore, Garford trucks have utilized a friction transmission, and it is understood that the other models still may be had-

un zion Google



Worm Driven Pierce-Arron Was a Distinctive Feature of the Shaw.

with this upon special order. However, the new specifications include a selective sliding gear with three speeds forward and a reverse. Drive is by jackshaft and double chains to the rear axic. Other changes have been made to correspond with the difference in transmission.

G. M. C., General Motors Truck Company, Detroit. One, two and three-ton stake, two-on delivery, 3.4-ton chassis and furniture van, and five-ton brewery wagon. This line reality is a combination of the old Reliance and Rapid, both of which retain their essential characteristics, although the design has been modified slightly. The models here-tofore known as Reliance are made in the two, 3.5 and five-ton sites, and the motor is mounted on a sub-frame at tached at three points to the main chassis frame. The the chair cases and equipped with a governor, more changed are such as are intended to give the machines better efficiency.

Grabowsky, Grabowsky Power Wagon Company, Detroit. One-ton plano wagon, three-ton chassis and furniture van, and five-ton brewery wagon. Motor is partially under the floor with a short radiator in front. Driver is located at the right with right hand levers. Several changes in design are noted, among them heing the new fonr-cylinder vertical motor, replacing the two-cylinder opposed engine of former years, and the substitution of a three-speed selection of the control of the selection of the control of the selection of the control of the heat-terfy valve type in the intake manifold and self-staters.

The motor, transmission and clutch are mounted as a unit on a aub-frame, which is removable bodily from the

chassis through the front. The short hood is hinged at the top, and the front cross bar at the left. These being opened, the power plant unit is so arranged that it sides in and out like a drawn at wooden horse, on which is mounted a pair of rails registering with those carrying the motor in the chassis, is rolled into place and the work of removal thus becomes a most simple matter.

Hewitt, Hewitt Motor Company, New York City. Three chassis, of one, 3.5 and 19 tons capacity, respectively, and seventon brewery wagon. Motor is either under the floor or beside the driver in the cab, and the operator is placed either at the right or left with levers, accordingly. Several other models are made to several other models are made yellinder opposed motor; some are supplied with selective stiding gear transmission and others with the planetary type.

As was true at last year's show, the troom Hewitt was the largest vehicle on display. This is one of the models with a planetary gearbox. The classiss was shown beside that of the one-ton, still further accentuating its size. The entire like offers little that is new in mechanical construction, it being claimed that the various feature have prove decidedly provided to the construction of the conference of the construction of the content of the con-

Knox, Knox Automobile Compuny, Springfield, Mass. Two-ton delivery wagon, five-ton wholesale fruit wagon, six-ton chassis, gasoline driven pumping engine. Motor is located under the floor in the two smaller sized trucks.

of the shaw, in the two smaller sized trucks, white in the six-ton vehicle it is beside the driver in the cab. Operator and levers are at the right.

The six-ton machine is a new model, although it does not differ materially from the five, except in the heavier construction. The principal distinguishing feature is the location of the motor in the cab, following the practice adopted by Garford, Hewitt and Morgan. Governors are fitted to all models this year.

The pumpling engine, which was seen for the first time at the 1911 show, has been chanced alightly, as subsequent tests have revealed the desirability. The pump is of the double-acting two-piston type, and the single chain drive of last year has been replaced by two chains. The motor is a six-ylinder unit, rated at 60 horsepower. The pumping capacity is 600 gallons of water a minute.

Laromobile, Laromobile Company of America, Bridgeport, Conn. Pive-due chassis, and combination chemical and hose wagon. In the truck, the motor is placed under the floor boards, with driver at the right and right hand levers. Accessibility is afforded by titting the seat backward, and minor adjustments may be made by the removal of side hands:

Inamuch as this is an entirely new model, produced by a concern which is well known in the pleasure car field, it will prove of interest to give a brief description of its mechanical details. First, it ought to be said that the company does not contemplate the construction of bodies at company does not contemplate the construction of bodies at the present, although it is understood that arrangements have been made with a Bridgeport concern to do this work if desired.

The motor is a four-cylinder unit, with hore of five inches



Peerless Line Was Represented by One Five-Ton Chansis Only, January Google

and stroke of six, water-cooled and rared at 45 horsepower at 990 revolutions, to which speed it is restricted by a governor of the vertical ring type. The crankcase is of bronze; the values are large and complete with quiet valve Biters, and, the crankshaft is of alloy axed carried on five

The carbactor is of the float feed type with saude jet-lead a Locomobile design. Mixture is controlled from the sext. Ignition is by high-tension magneto and storage battery. Cooling is by means of a honeycomb radiator with gear driven centrifoxal jump, the former being protected by channel cross members and supported on one-inch rabbers. Lathrication is by a self-contained system for the motor, a gear driven pump forcing oil to all bearings in a constant stream. Greace cups are filted at all wearing points on the chassis.

The transmission is a funraspeed selective type with a break grarrase. Clutch is of the dry disc type; 14 special steel diss, seven of them being lined on both sides with non-burn material. Drive is by double chain. Springs are semi-elliptical, 24 clucks long in front and 50 in the evar. The latter are shackled at both ends. A transverse jack spring is fitted to aborb all road sloveks.

Front axle is a solid forging of the t beam section, and pivots have roller thrust bearings to reduce friction. The

in front and two in the rear enables the entire power plant, consisting of metor, cooler, clutch, transmission, steering wheel and driver's seat, to be taken from the chassis.

This also is a new model, produced by a well known pleasure car maker. The four-cylinder moor has a bore of 4.25 inches and stroke of 5.5, water-cooled, and rated at 35 horsepower at 100 revolutions, maximum torque being developed at this spread. The cylinders are offset, and the erankolatt monated on annular hall bearings. Valves about a complex of the control of the control of the body of the control of the control of the control of the body of the control of the control of the control of the posing the latest European practice.

A governor operated on a valve in the indet manifold separate from the earburetor, permits the operator to remove the vaportzer without disturbing the governing mechanism. Carbureton in by a Lozder device located on the left side, while ignition is by 10seh magneto, placed on the right, and storage hastery.

Labrication is a combination of sphash and force feed, the sphash level being adjustable from the front end of the motor case. Oil is taken from the bottom of the crankcase by a gear driven pump and distributed to the bearings and sphash peckets, overflowing into the oil cellar through a strainer.

The transmission and jackshaft are made up of two



Exhibit of Speedwell Tracks Decapted a Prominent Position I adequent the Elevated Platform on the Main Ploor,

rear member is a rectangular section forging of alloy steel. Emorgency brakes expand on sprocket drum boiled to the rear axie and the service members contract on a dram on the jackshaft to which front sprockets are boiled. Wheels are of cast steel, 40 inches in diameter, with roller bearlags front and rear. Wheelbase is 140 inches, tires 40 by at lanches, single in front and dual in rear.

The fire wagon shown did not differ materially from those which have been displayed by this concern previously. A slightly longer wheelbase and a special form of rear ask, somewhat heavier in construction, were the principal features noted.

Louier, Lozier Motor Company, Detroit. Five-ton chassis. Motor is located under the floor boards, with driver and levers at the right. Motor, transmission and driver's seat are mounted on a sub-frame, which is supported by spirings, Independently of the frame and springs of the chassis itself. Accessibility is afforded by lifting the floor boards and turning the seat out of the way, or these may be entirely removed. The properties of the company of the

separate units, the former being of the selective sliding gear type, with four speeds forward and reverse. Clutch is of the standard Lexter design with 28 bardened any blade steed discs enclosed in an oil tight flywheel case. Power is transmitted from the clutch to the transmission through a double universal joint of the block type, made of high carbon steel, hardened and ground, and enclosed in a metallic dust proof oil case.

Service brakes are mounted on the jackshafa and are of the contracting hand type, I I inches in diameter by 2.5 in width. Emergency members are of the internal expanding type enclosed in the rear wheel dram. Is inches in diamerer and with four-inch faces. The sheel-base is 134 inches, the bod on the front wheels as the truck load is increased.

Front and rear asless are drop forgines from high carbon, heat tracted, open hearth, steet, and of rectangular section. On the front members the spring pade are carried below the centre of the wheel, the attal having a drop of the lackes, allowing the lower half of the motor case to fire tackes, allowing the lower half of the motor case to permits the existent to be placed sufficiently low in the subframe to give practically a straight line drive.



Detroit Electric Line Was Shown on the Elevated Platform

Springs are semi-ciliptic in front and platform in rear. Wheels are of the artillers type, and are equipped with 36 by five-inch front and 40 by five-inch rear, standard S. A. E., demonstable tires, dual behind.

Mack, International Motor Company, New York City. One-ton chasis, 1.3-ton army water filter wagon, three-ton telephone service wagon with winch, five-ton brewery wagon and seven-ton coal dumper. Motor is located in front, with driver and levers at the right. This portion of the International Motor Company's exhibit is made in the Mack works at Allentown, Penn. The chassis details offer very little change from the Mack trucks of previous years, the special features of the exhibit being the novel body designs.

The subject of dumping bodies appears to be receiving merited consideration by a number of makers, and the seventon coal dumper at this space was a centre of much interest throughout the week. The boisting device is mounted on special braces fitted to the back of the cab, and the mechan-

ism is operated by means of a transverse shaft directly beneath and in the same plane as the upper cross shaft. This is driven from a smail countershaft, strusted in the transmission, by means of a worm and worm wheel, and this small shaft is in turn operated by a sliding spur gear, which meshes with the second sweed gear on the main transmission countershaft, when the hoist is to be used. When the stiding sour gear is thrown into mesh, the driving dug for the main countershaft gear is thrown out, which makes it Impossible to move the vehicle while the body is being raised. The latter, however, can be stonged in any position, and the truck driven over the road without the body being drawn back to its original position.

briving into position for dumping, the operator moves the small land lever at the right of the seat forward and downward, bringing a sibiling gear into mesh with the second speed gear and at the same time disengaging the in-

termediate gear clutch. The goar shifting hand lever will also be moved into the second speed, and the clutch let in, which is been shifted by the best of the second speed, and the clutch let in, which is the body immediately will begin to ascend. When in its extreme upward position, the clutch automatically is through out by means of a stop on the bolisting chain, which prevents the lifting arm being drawn over centre.

To lower: The reverse is engaged, and the clutch let in, when the body begin it as descent. As before, the clutch automatically is thrown out, just before the body reaches the frame, which prevents the former coming down hard upon the latter. The amall hand lever is pulled back into position and the driver is free to resume his journey for another load. The whole operation takes about 20 accounds. In the device abown the tail gate was operated automatically, altiough it is possible to obtain this for hand operation to united the entire contents of the whole we within possible to united the relater contents of the whole we within the possible to be clutch pedal.



Important Dispiny of Duplex Brakes and Other Equipment, Made by Royal Equipment Company, Beside Edison Storage Hattery Exhibit.



Marburg Bros., Inc., Displayed Wes Magneton and Other Products,

The water filter is a device patented by Oaborn Congleton, for which the fitternational Motor Company has ascured the rights of manufacture. It is claimed that by its use, Joseph Company of the Company of the Company of the The mater famet controls the pume, which is operated by The mater famet controls the pume, which is operated by the company of the Company o

Martin Tractor, Knox Automobile Company, Springfield, Mass. One complete tractor monited on a new Knox sixton truck. Although originally designed to be supplied with three wheels and still marketed as such, the procedular rangement is with one wheel in front and suitable mechanism in the creat for attaching to the king hold of any horse to be a supplied of the complete of the

McIniye, W. H. McIniyre Company, Auburn, Ind. Oneton delivery, 1.5-ton chassis and 1.5-ton mattress car with extra high top. Motor is located in front, under a bood, with driver and levers at the right. A notable change is is in the substitution of a fore-yilinder vortical engine for the old two-yilinder opposed unit. The enclosed planetary transmission is another feature, and the service brake has

been taken from the rear wheels and placed on the Jackshaft. In other respects, the line has no been changed materially, and the governor is retained on all models.

Morgan, Morgan Motor Truck Company, Worcester, Mass. Twoton express, three-ton chassis and five-ton coal dumper. Motor is placed in the cab heside the seat. with right hand levers and driver's position. Few changes in mechanical construction are noted. the same steel wheels, rubber cushioned jackshaft, etc., being retained. The addition of brake equalizers auxiliary rear springs and a sitchtly heavier radius rod practically comidete the list. The two-ton chassis is a new model. with the same essential Morgan characteristics

The coal dumper proved of decided interest. Strictly speaking, it is not a dumper in the usually accepted use of the term. The body and load remain stationary, the coal being discharged through a metal chute by means of an Archimedian seron Power to one erate this is conveyed from the motor through a change gear mechanism, tu which an extra mear and a shaft lead to a chain wheel mounted on the side of the chassis. A much larger wheel is mounted on the end of the convever shaft opposite to that on which the chute is attached to which it is fastened by a key. The withdrawal of this key permits the chain and wheels to rotate idly while the truck is being driven. When the load is drawn into position, the operator slips the key into piace, when the motor turns the screw and the coal is forced out through the chute.

Packard, Packard Motor Car Company, Detroit, Mich. Twoton stake body, and transcontinental prairie schooner, dairy

wagon, cased beer wagon, van, gas crane, and slatted and agate aided body, all on three-ron chassis. Motor is the from under a hood, and driver is at the right with right hand leeves. The two-ton model is new, being identical with the larger chassis, except for its lighter construction and like Packard 19 horsepower motor. The addition of an automatic spark retarding lever, for use in connection with starting, amment to be the only change of note.

Peerless, Peerless Motor Car Company, Cleveland, O. Om five-ton chassis. Motor is located in from ander a hood, with driver and levers at the right. The design has a proven so satisfactory under every kind of service during the past year that only such changes as make for refinement on detail are noted. Maximum speed of the motor is limited by the action of a centrifucal governor on butterfly avive, focated in the intake manifold between the throttler and cylinders. Governor adjustments are enclosed in a housing, which is sealed. A shutter interposed between the glaws of the starting crank and crankshaft prevents cranking the motor will the saseft. As heart ringer can be motor will be somethand to the motor will the saseft has been retarded.

Pierce-Arrow, Pierce-Arrow Motor Car Company, Buffalo, N. Y. Five-ton chassis, coal dumper and brewery service wagon. Motor is in front under a bood, with driver and levers at the right. The principal feature of the Pierce-Arrow truck is the worm and worm wheel drive, which was



Splendid Exhibit of Ball Bearings Made by New Departure Company Google



Paeamatic Dumping Device Displayed at the Sampson Exhibit.

brought out last year. One of these assemblies, with the over the rear axie provides for overload. Wheelbase is 126 housing partially cut away, was presented for inspection and the attendants were extremely busy explaining its metiod of operation. As positive proof that the arrangement is completely reversible, opportunity was afforded for those who wished to make the worm drive the wheel, or the wheel the worm, with equal case and smoothness of action. In all respects, it was announced that the 1912 model is exactly the same as the 1911. The dumping body is operated by hand winch

Pope-Hartford, Pope Manufacturing Company, Hartford, Two three-ton service wagons, and combination chemical and hose wagon. Motor is located under the floor, with driver at the left and levers in the centre. Accessibility is afforded by tipping the seat backward, or the seat and floor boards together. This is the first time this well known pleasure car maker has exhibited a truck, although the first vehicles of this type were produced in the early summer

The motor is a four-cylinder, water-cooled unit, rated at 40 horsepower, the maximum speed being regulated by a governor operating entirely independent of either hand or foot throttle. Ignition is by Bosch high-tension magneto. dual system. Lubrication of the motor is by a mechanical

oiler on the crankcase with a large suction pump and standpipe, which is used as an overflow, permitting oil when it reaches the level of the standpipe to run back through it luto the crankcase. The crankcase proper is provided with standoines, fitted with gauge strainers, serving to maintain at all times a predetermined level in the case. Oil is pumped from the oller to the cylinders. The main bearings are lubricated by spiash from the crankcase. The transmission and differential also are lubricated by splash. All other parts are provided with oil or grease cups wherever necessary.

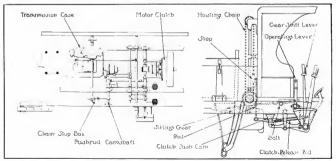
The cone clutch is leather faced with cork inserts. The transmission is of the selective sliding type with three speeds forward and reverse. Drive is by double side chain. Springs are semi-elliptic, 44 inches in front and 50 in the rear. An auxiliary cross spring

inches. Wheels are 36 inches, demountable, fitted with Timken roller hearings. The front axle is a solid i beam section, the rear member a solid forging.

Three sets of brakes are fitted; contracting hands on each end of the jackshaft, 12,4375 inches in diameter and 2.25-inch face; contracting band on transmission shaft. the same size, and emergency, internal expanding band on rear wheels, 18 inches in diameter with three-inch face. Tires are 36 by five inches, single front and 36 by four, dual in rear.

Very little change was noted in the fire apparatus, this concern having given its attention to the construction of these vehicles for some years,

Iteo, Iteo Motor Truck Company, Lansing, Mich. Three 1500-pound delivery wagons. Single-cylinder motor is lo-cated underneath the chassis. Driver is at the left with left hand levers. Practically the only change in design over that shown for the first time a year ago, is in the fitting of mudguards. The Reo has demonstrated its efficiency as a satisfactory solution of the light delivery problem under every condition to which it has been applied, and there appears to be little reason in the mind of the designer, R. E. Olds, for changing its mechanical construction.



Shelch Outlining Feniures of the New Self-Damping Body un the Wack Truck, Operated by the Motor Withd

Sampson, Mides Sampson Manufacturing Company, Detroit. One L.-Jonn chastle, Life-on delivery, 1000-pound delivery, three-ton stake hody and five-ton coal dumper. In the smaller vehicles the motor is in front under a hond, but with the larger it is under the floor boards. Driver is at either the right or left, sait levers placed accordingly. Practically no channe has been made in mechanical conlinh rare where has been made in mechanical conlinh rare where has been deadled with the protine of the properties of the properties of the protine of the properties of the pro-

The dumping arrangement is decidedly new, a sylinder behind the driver's seat serving to ratio and lower the carrying receptacle by means of compressed air. This air is stored under pressure of 1¹⁰0 pounds in a tank on the rear end of the chassis frame, a single-cylinder pump being operated from the change gear mechanism. This compressor may be connected directly to the pneumatic hoist, in case the storage tank should become punctured or the air line should develop a loak. A Westinghouse brake, operated deer. The end gate is so arranged as no open automatically, so that the entire operation of dumping the load may be performed without the driver leaving his seat.

Saurer, International Motor Company, New York City, One 6.5-ton chassis and imported pumping engine. The Saurer is manufactured at the plant in Plainfield, N. J.,



Skrieton View of Pierce-Arrow Worm and Worm Wheel.

and the new fire equipment also will be produced in America. The special features of the truck are retained, these being the novel type of carburetor with two nozzles, compressed air self-starier and so-raised motor brake. As is more or less well known, this latter embraces a hand throttle lever on the steering wheel interconnected with valves can be changed to permit the motor to exert its maximum retarding effort.

The pumping engine is equipped with a 60 horsepower four-cylinder, four-cycle, water-cooled motor, which may be coupled to a centrifugal pump, capable of delivering 500 gallons of water a minute at 100 pounds pressure. The latter utilizes the Suizer patented self-priming feature, which has given excellent satisfaction in service abroad.

Speciacil, Speciacil Motor Car Company, Dayton, O. Four-ton chasis, four-ton stake body and six-ton coal dumper. Motor is located under the seat, with driver and levers at the right. Accessibility is afforded by Illing the seat to the side, an exceedingly novel arrangement, which is expected to meet with decided favor. Mechanical changes are not numerous, the most important being the addition of a differential lock and an automatic advance magneto.

In the coal wagon, the dumping is effected by means of a motor operated rack and pinion mechanism, which takes its motion through double reduction gearing from the propeller shaft. Provision is made for depositing the



Tilting Sent Exposing Power Plant on New Pope-Hartford.

load at either side or the rear, so as to make the use of the truck equally valuable, whether or not it is possible to back up to the dumping location.

Stearns, F. B. Stearns, Cleveland, O. One five-ton chassis, Motor is in front under a hood, with driver and levers at the left. Engine and transmission are mounted on a sub-firmme, which is carried by semi-elliptic aprings on the main chassis frame. Practically the only change is the adoption of the left hand control, although the addition of a differential lock operated by means of a lever on the gear shift quadrant may be mentioned as well.

White, White Company, Cleveland, O. Fifteen hundredpound delivery wagen, 15-50 hus, three-too moving van, five-ton Standard Oil tank wagen and five-ton lumber body with trailer. Motor is in front under a bood, with driver either at the right or left with levers accordingly. The five-ton vehicle is an entirely new model, although its mechanical features to not differ materially from the breetured by this concern herections.

Considerable interest attached to the lumber equipment with its trailer. These were loaded with beary timbers, such as are used in subway construction in New York City. The trailer is a high two-wheeld device, bod with steel tires and equipped with brakes operated by lever from the driver's seat. It is attached to the main truck by means of chains. The discrete control of the co

ELECTRIC COMMERCIAL VEHICLES,

Baker, Baker Motor Vehicle Company, Cleveland, O. Half-ton delivery, two-ton chassis and two-ton express hody



Method of Mounting Motor in the New Loster Truck, Google



Directing Accessibility of Grahowsky Power Plant.

with serven sides. Minor changes have been made in all models, and the larger chassis has been redesigned to conform with the smaller. Emergency brakes, mounted on the countershaft, have been added, and all bearings are now bronze hushed. Sprockets are reversible, so that when the teeth are worn on on side they may be turned. Controllers are enclosed this year.

Bronx, Bronx Electric Vehicle Company, New York City. Half-ton chassis, half-ton delivery wagon and four-ton chassis. This is an entirely new line, and includes machines in varying capacities from 800 nounds to five tons.

Motors are of the General Electric make, nothing less than 80-voit with 60-cell Edison battery or 32-cell lead battery on smaller models, and 85-voit with 44-cell lead battery, except when Edison is preferred, on the larger. All motor armatures ruin on ball bearings, in fact these are fitted wherever possible, the maker calling the product the ball bearing Roma.

The first reduction is by quiter chain drive to the counterbalt, housed in an aluminum easine, the chain running in oil. The second is by roller chain from the countershaft to rear wheek. All aprockets are of ample size, accurately cut from high grade steel. The steering gear is of the irreversible type with ball thrust hearings, rightly mounted on chassis. Two sets of brakes are operated independently, All hubs are fitted with hall hearings, non-adjustable, it being claimed that these reduce friction to the greatest possible of the counterbalt of the counte

A special feature is made of the straight line drive from the countershaft to rear wheels, It being held that noise and chain "shapping" have been entirely eliminated. Frames are of pressed steet, except in the larger models, where channel section is used. Springs are of siltco-manganese steet bushed. Sbackle holts are hardened and have interral grease cups. Atles are of nickel-vanadium steet, either rectangular or I beam section. The tire equipment is said to be well within the tire manufacturer's requirements for the load the vehicles are designed to carry.

Betroft, Anderson Electric Car Company, Detroit. One 1.5-ton chassis, hall-ton panel body, one-ton necroes side delivery. As is well known, the maker -lainst this machine has been built around the Edston hattery. Pew changes in chassis design have been found necessity, although the 1.5-ton model is new, with the same general characteristics of the company of the same person of the company of the ju-understood that two other sizes, a two and a three-ton, will be placed in the market in the near future.

6. M. C., General Motors Truck Company, Betroit. Three ton chassis, 1.5-ton delivery, six-ton express and English coach. This is a new line, although the design is by John M, tanselen, who has been engaged in the design and manulacture of electric commercial vehicles for the pass eight properties. It follows that he has incorporated a number of centures which have been successful in service, and service, and whole the line is in no way experimental, although offered to the numble for the first time.

Complete accessibility is one of the distinguishing features claimed. The notor is for the single enclosed type, specially would for maximum efficiency with the control and battery characteristics. The battery, either lead or Edison as specified, is located above the frame, and the controller is under a small hood in front of the dash. Five speeds forward and two reverse are obtained by a handle above, and eccentric with the steering wheel.

The frame is of sired, channel section, with iron faced wood bumper in front. The drive shaft is of the lannagen type, a flat spring tempered steel blade, flexible and selfaligning. Contrer-haft is of the floating type, with nonadjustable ball bearings. Springs are semi-clijute, both front and rear, with auxiliary helical members on the rear axle to take care of abnormal loads and road shock. Axles are solid forgines, front and rear, the steering annex the perturn of relevant to the steel of the steel of the steel of the land of the steel of the steel of the steel of the steel of the best being emilioned for dual tires in the rear steel.

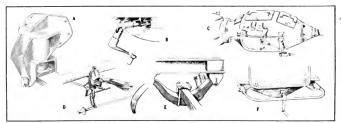
The six-ton chassis was the largest electric vehicle in the show, but chief interest in the exhibit centred around the English coach, which is built to accommodate 12 on the inside, one beside the driver and four on top. Entrance to the interior is by side doors.

General Vehicle, General Vehicle Company, Long Island City, N. Y. One 550-pound delivery, 180-190-pound delivery, 180-190. American express wagon, 33-100 hrewery bottling wagon, 58-100 chasals, two five-ton key trucks, 58-100 bettling wagon, and one-ton industrial pier truck. The last named is a new model, and of especial linerest. The remainder of the line is offered with practically no change, the remarkable success of General Vehicle wagons under all conditions of service having demonstrated that the detail

The pier truck has low wheeled vehicle with platform in front for the driver to stand upon. Steering is accomplished with the rear wheels while the drive is through the front members. The controlling devices are somewhat unusual and correspondingly interesting. The brake pedal, which has a long crosswise foot livee, occupies a place in the centre of the operating platform. When this pedal is up the brake is on, and it is necessary to devires it with the foot in order to review the mechanism. The steering vertical motion only, and a corresponding they on the concept.



Location of Motor in the Cob on Five-Ton Garded.



Some Mechanical Features Seen at the Garden). A. Sampson Supplementary Spring: B. Peerless Starting Crank Support; C. Mrintyre Enricosed Pinnetary Genrset; B. Spring on Locomobilet E. Hewlit Bran Spring: F. White Tubnian Bumper,

site side operates the controller. The battery is sufficient to run vehicle 20 miles on a single charge, and is suspended in a eradic at the front.

Lansden, Lansden Company, Newark, N. J. Chassis, but delivery and row discovery and seven changes. The delivery and row shows a group and seven processing the throughout. Comparatively shorter chains are used for shall drive, and silent chains have replaced the roller members between motor and jackshaft. Frames are of a steel instead of wood. A new suspension carries the motor from a single cross member instead of from two. Sprockers are keyed and tapered on instead of planed. Timken roller bearings take the place of bronze, and the controller is of the open type instead of closed. A new method of attachment makes it possible to remove and replace the wheels readily.

Studebaker, Studebaker Corporation, South Bend, Ind., One 1000-pound panel delivery wagon. The line practically is unchanged, standard features having been demonstrated as a satisfactory under nevere unsee in various classes of service ince. The vehicle shown has been made a trifle lighter in lighter in the source respects and now uses Timker roller bearings. News the standard services and the service of the services of the se

Wart, Ward Motor Vehicle Company, New York City. Three delivery wagons of 700, 1000 and 1500 pounds, respectively. No new models have been added, and only slight changes mark the line. The old style plain bearings have been replaced by Timken roller members, and iron clad batteries are used instead of the grid plate style formerly employed.

Waverley, Waverley Company, Indianapolis, Ind. Halfton delivery, one-ton delivery, 25:00-pound chassis, three-ton chassis, and central station trouble wagon. The half-ton model is new, and employs a shaft drive instead of the usual Waverley chain. The battery is an Edison. In all other respects, it follows the essential Waverley characteristics. The trouble wagon practically is a remodelled pleasure vehicle, providing space for such tools and materials as would be needed in this work.

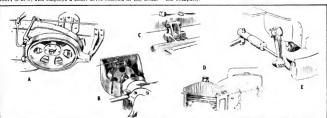
LANGE COMPANY TO MAKE TRUCKS.

The H. Lange Wagon Works, Pittsburg, Penn, maker of wagons for over 40 years, announces the organization of a subsidiary company to be known as the Lange Motor Truck Company which concern will erect a new and modern concrete factory with floor space of 40,000 square feet. When equipped the plant will begin the manufacture of 100 commercial rehelies as the first season's output.

The new industry is not altocether unfamiliar to the Lange concern as during the past five years! It has represented the Gramm, Dayton and Chase lines, building bodies to sult the requirements of the purchaser. A feature of the Lange product will be that everything but the motor and wheels will be Pittsburg products. The engine will be a Continental. The best of material and workmanship will facture a high grade machine.

KISSELKAR BRANCH NOT AFFECTED.

The KisselKer New England branch, Boston, is in no way connected with the Kissel Kar Kompany, a company in the hands of a receiver. H. B. Pruden, president of the former concern, states that none of the officials of the Kissel Kar Kompany are connected in any way whatsoever with his company.



Additional Canaiructional Detalla at Garden Dispinys A, Louier Brakes and Chain Fase; B, Erabowsky Enclosed Brakes C, Locanabile Genther Sappart) D, Pierce-Arrow Hadining; E, Uniford Steering Gent.

TRUCK DISPLAY AT GRAND CENTRAL PALACE.

S HARING interest with pleasure cars and accessories, motor trucks were displayed in the new Grand Central Plaine, New York City, Jan. 19-17. So well pleased type of vehicle that a determined effort was made to security the control of the management in a plan to continue the show until Saturday evening, Jan. 20, at which time the Madison Square Garden truck display was brought to a

The exhibit was under the auspices of the National Association of Automobile Manufacturers, and the direction of S. A. Miles, general manager of that organization. The splendid appearance of the interior of the building was such that practically no decorations were needed. The following review of the exhibit presents first the make of machine, in alphabetical order, with name and address of machine, in alphabetical order, with name and address of peach.

Aries, J. Jaccard & Co., New York City, Seven-ton chassis and seven-ton brewery wagon. This is a French

The motor is of the opposed cylinder type, rated at 12 horsepower, and is regulated by a centrifugal governor, which also automatically advances the spark when the speed of the engine requires it and insures a fully retarded spark for starting. A friction transmission is employed comprising one driving and one driven disc, with final drive by side chain to rear axic. A particular feature is the voke shaped steel frame which carries the discs and their shifting mechanism. This is secured under the main frame of the car with the yoke opening toward the rear. The countershaft, upon which the sliding disc is mounted runs in hall bearings carried at the ends of the yoke arms, and the driving disc is journaled in ball bearings at the apex of the yoke. The object of this construction is held to be that of imparting rigidity to this important part of the mechanism and preventing disalignment under heavy stresses

Brooks, New York Auto Wagon Company, Brooklyn, N. Y. One huggy type delivery. Driver is placed in front with left hand seat location and right hand levers. This



General View of One Corner of the Teuck Diaplay in Grand Central Palace, Priction Delven Commerce in the Poreground.

product and is more or less well known in America, although never exhibited at a New York show previously. Perhaps its chief distinguishing feature was the use of steel ites, although it is understood to the control of the instanting, and a spring in the steering rol is designed to take shock off the driver's hands. The motor is very accessible, and is enjuped with a governor. The general impression of the mackine is one of great strength, and this is carried out even in minor details.

Atterbury, Atterbury Motor Car Company, Buffalo, N. Y. One-ton open delivery with scanding top, two-ton stake body and three-ton brewery wagon with high panels. Motor is located in front under a hood, and driver and levers at the right. The line offers few changes from past design, although each model is now furnished with an automatic sealed governor, and fixed ignition by Bosch high-tension magnetic.

Rest, Durant-Dort Carriage Company, Flint, Mich. Eight hundred-pound chassis and panel edilvery of same capacity. Driver is located above the motor with left hand control. This is an entirely new car, made in the factory of the Flint Motor Wagon Company in the same city.

is also a new product in which several novel features are presented.

The motor is a two-cylinder, two-cycle, air-cooled horizontal unit, supported by means of shackles, transversely across the frame with crankshaft parallel with the rear anie, the distance between centres being varied by shifting the engine backward and forward to obtain the different per varied to the control of the con

The transmission is the roller device invented by Charles E. Darryen, in which the driving rollers are growed and fit in correspondingly grooved rings bolted to the driving wheels and are attached to the crankshaft of the engine. There are two pairs of driving rollers, one for slow speed and reverse and a larger pair for high speed. Similarly there are two sets of rings, arranged concentrically with grooves facing.

Bringing the smaller rollers into contact with the outside rings, by shifting the engine with the speed control lever, obtains allow speed ahead. When these rollers are shifted so as to come in external contact with the inside



Durable Dayton Decupied a Position of Vantage, in Which It Was Possible to Unit Attention to Its Constructional Details

rings, reverse is secured. Shifting the rollers inward and forward brings the larger pair into internal contact with the outside rings and gives high speed shead. The shifting devices are held to be simple and positive, being controited by a single lever which is placed directly in front of the detree.

Cass, Cass Motor Car Company, Port Huron, Mich. Twoton wide and low stake platform truck. Moor is in from under a bood, and is mousted on a sub-frame which rests on a three point suspension. The clutch is a patentied combination of disc and cone. In all other respects there has been little change over previous construction. Special art of the properties of the company of the properties of the larger than is usual with whiches of this capacity. A goveeror is fittled this year.

Chase, Chase Motor Truck Company, Syracuse, N. Y. One-ton classis, one-ton panel delivery, 1500-pound panel delivery, one-ton screen body, 1.5-ton screen body and two-ton express flare board body. Motor is located in front under a hood, with driver and levers at the right, The 1.5

and two-ton vehicles are new, although they do not differ materially from the older and better known wagons of this materially from the older and better known wagons of their construction. The more is done that they are of heavier construction. The more is a second of the second of the cylinder, two-cycle, air-cooled unit, the system of air-cooling comprising a powerful suction fan, which is integral with the flywheel. An opening at the front and top of the motor, and another at the rear and bottom cause a strong current of air to be drawn in, circulated around the cylinders and passed out at the rear.

Commerce, Commerce Motor Car Company, Detroit. Haif-ton chassis and panel delivery wagon of the same capacity. Motor is in front under a hood, with driver and levers at the right. The Commerce is another new design for New York shows.

The motor is a fonrestinder, four-cycle, water-cooled unit, with bore of 3.25 inches and stroke of 3.375 inches, rated at 20 horsepower. Cooling is by thermo-syphon, with flat tube vertical flow radiator and extra large reserve tank. Olling is by the forced feed spissa system, in which the lubri-



Comprehensive Showing of Universal Trucks, a Detect Product Which Presents a Number of Distinctive Features. See Google

the motor.



Decatur "Hoosier Limited" Was Shown for the First Time in New York,

cant is forced direct to both end bearings, and runs back into the crankcase through passages provided for this purpose. Ignition is by Bosch high-tension magneto with fixed smark.

The friction transmission is controlled by one lever, and final drive is by single chain to the rear axle. Brakes are internal expanding on rear axle, operated by pedal, and the friction reverse provides for emergency. Frame is of pressed steel, heavily braced and reinforced. Springs are semi-elliptic with swinging shackles, said to be very resilient and easy riding. Wheelbase is 96 inches. Front axie is a heavy tubular drop pattern with special reinforced steering knuckles and arms, and the rear member is of the centre chain type with live axie and large differential. Wheels are of the artillery type with large ball bearings in the front hubs. Tires are solld, 36 by two inches, front and rear, although pneumatics may be had upon special order.

Commer, Wyckoff, Church & Partridge, Inc., New York City. One 4.5-ton chassis, one 4.5-ton high stake body and one Imported 6.5-ton brewery wagon. Motor is in front under a bood, with driver and levers at the right. There

practically is no change offered in this well known line, a distinctive feature of which is the gearset. This is of the constant mesh type, in which dog clutches serve to connect the individual gears to their shafts, only when permitted to do so by a special governor, which prevents such movement except when the engine speed is at a proper point with relation to the speed of the car.

Dart, Dart Manufacturing Company, Waterloo, la. One 1500-pound panel delivery and one 1500-pound flare board wagon. Driver is located above the motor, which is underneath the chassis, and levers are at the right.

The motor is a twocylinder, four-cycle, water cooled, opposed unit, with bore of 4.25 inches and stroke of five. with valves interchangeable and mechanically operated, rated at 16-20 horsenower. Cooling is by thermosyphon with extra large honeycomb radiator of the square tube type, ignition is by Splitdorf magneto and dry cells. Lubrication is by a pump oller on top of the crankcase for the engine, while all other parts are provided with grease cups,

The transmission is an improved planetary, giving two speeds forward and reverse, low speed and reverse being secured by pedal and the high speed by hand lever. Clutch is a multiple disc member. Drive is by three roller chains. Brakes are internal expanding on rear wheels, operated by hand lever, with external contracting service brake on the jackshaft actuated by pedal.

Axles are square steel, 1.5 inches front and 1.75 rear, with ball bearing hubs. Frame is of pressed steel, securely braced with cross braces supporting Wheels are 34 inches, with 1.75-inch Firestone side wire tires. Springs are full elliptic front and

rear. Wheelbase is 80 inches. Decatur, Decatur Motor Car Company, Decatur, Ind. One La-ton chassis, and low sided box body of the same capacity. Motor is under the floor with driver and levers at the right. Although this line was produced in a number of differing models last year, it is announced that the entire energy of the company will be devoted to the manufacture of but this one chassis in 1912.

The chief characteristic of the Decatur "Hoosier Limited," as it is called by the maker, is the accessibility of the power plant, a 30 horsepower Rutenber. The body is held In place by four bolts, and above this are located the dash and sent units, the former comprising the radiator, dash, floor boards, clutch and brake pedais, foot throttle, gasoline tank, side panel locks, change speed lever and emergency brake control. This also is held in place by four bolts, as are the seat and side panels,

The radiator is hinged at the side, so as to open like a



4 "Golden Chassis" Decapled the Centre of the Lippard-Stewart Diapiny.

door. If it be desired to remove the entire power plant, the loosening of four bolts, makes it possible to lift off the seat unit, and loosening four more bolts permits the removal of the dash unit. This is claimed to be the work of but a few moments, and makes it possible to replace the motor without difficulty any time desired, whether the truck be loaded or not.

The rear string system also is soonewhat needlar. In addition to the three-spring judatorm system, there is a cross spring extending from centre to centre of the main rear springs, is ends just above flat plates bolied to the tops of the main springs and clearing them by about \$\(\frac{1}{2} \) in the main springs and clearing them by about \$\(\frac{1}{2} \) inch plate of the main springs and clearing them by about \$\(\frac{1}{2} \) inch plate of the main springs and clearing them by about \$\(\frac{1}{2} \) inches in the main springs and clearing them by about \$\(\frac{1}{2} \) inches in the spring of the main springs and clearing them by about \$\(\frac{1}{2} \) inches in the spring of the main springs and the spring of the springs of the main springs and the springs of the springs of

Darable Dayton, Dayton Auto Track Company, Dayton, O Three-ton chassls and Li-ten express wagon. Moor is under the floor. Driver is at the left with centre levers. The line comprises three models, the other being a five-ton-machine, in which the same fectures are incorporated throughout, the only difference being in the size of the engine and the strength of construction. All motors are of the T head type with a tendency toward the long stroke.

Lubrication is by forced feed through crankshaft to all bearings, no oil being carried in the crank-

The motor is located on a sub-frame and the transmission is carried on a three point suspension. Drive is through a Hele-Shaw multiple disc clutch to a selective sliding gearset, thence by propeller shaft, placed in a straight line with the engine and using two universal idints, one at either end. one of which is a sliding indut. Final drive is by side chains from the lackshaft to rear axle

Eclipse, Eclipse Truck Company, Franklin, Penn. Two-tor, chassis, one-ton flare board with top, three-ton screen side express and four-ton stake body with top and side gate. Motor is under the floor with driver and leycrs at the right. While It is announced that this line will carry a compressed air self-satter, it was not

shown at the exhibit A governor is litted on all models. The motor is on a subframe, and complete accessibility for replacement is provided by the remeval of the entire seat framing, the work of a few mitutes only. A come-clutch, leather faced, is employed. The transmission is of the selective type, providing three speech forward and reverse, with general subsystem in mesh, combined with differential and packshaft. Final drive is by chalips.

Frame is of sited, four-linds cinnumed section. Wheels have its 105 or 112 inches. Wheels are of the artillers type, fitted with solid tires, single from and dual rear Ades were reduce bearing. Sortings are of allow manances, sometimes, the time strength of the solid section of the solid section of the service members, being double duality in factshaft, and the service members, double internal expanding on per hubs

Federal, Federal Motor Track Company, Detrol. Chassis, serem side express and low stake platform body, all of oneion capacity. Motor is in front under a bood, with driver and levers at the left. In order to attain the unions accessibility of parts libble to need attention, this compans has arranged the mechanism in three unity, motor, clutch and transmission, each removable independently of the others. A governor of the contribugal ball type is located in the throttle, permitting a maximum car speed of 15 miles an hour.

The four-sylinder, four-syle, water-couled motor is haus directly on the side rails of the frame, clinibating the necessity for the sub-frame. The selective silding gear transmission, and the jackshaft to which it is bolted, are carried on a three point suspension, and the details of this brakets, with the openines hanging downward, carry the outer end of the jackshaft, being counterbored to receive lackshaft tube brakets. Thus, by merely removing the rationing series and sliding the table brakets out a short distance from the frame, the rear end of the trakets the chaosis by moving the whole unit backward a short distance to disengage the universal mounting in front.

Drive is taken through a radius rod which consists of four parts; the his brake entire which is mounted on the axie, the radius rod proper hinged to the hub brake centre, the radius rod ornnection which mounts on a spiterical on the Jackshaft tube bracket, and the radius rod adjuster which is threaded into the radius rod and the radius va-



Self-Starting Velle Line Was Well Hepresented by Three Vehicles of Varying Street

connection. It is claimed for this construction that it has several important points in the favor. Movement in any direction is taken care of willout throwing any strain on the parts of the radius rod, as the front onto its universally mounted, this high brake centre is free to rotate around the next period of the radius rod, as the front onto a round the next to take care of any sides was that may occur.

Gramm, Gramm Motor Car Company, Lilma, O. Twa-ton express, three-ton chasses and six-ton dumper. Motor is in under the floor, with deliver and levers at the right. Among the special features are the moniting of the engine on a sub-frame, permitting easy removal, and the fifting of a contributal ball governor on the thoritie. All models are allike, with the exception of size and weight. For changes are noted over previous completization.

The dumping body displaced is of special interest, the dumping feature being operated by the uniter. A nickel sized planet loved must the rear end of the propuler starfengages with either one of a part of module gers of the engages with either one of a part of module gers of the extension in the propulation of the propulation of the extension universal starf extending ferward to a point just helpful the word, driving the gears of the besty acturings

Maried or Google

mechanism. The cage is confected by a lever at the driver's seat mounted on a quadrant, the three positions or which give forward, reverse and neutral movements. Incorporate in the mechanism is an irreversible worm and where, which holds the body in any position when the control gears are shifted into making the properties of the control gears are shifted into making the properties of the control gears are

The winding drums for raising are located immediately bank of the seat. Chains from these extend upward and over sheave wheels supported on a derrick, thence downward to the lower end of two unright less on the front of the body, where they are secured by means of steel fastening brackets. The raising may be accomplished either with the truck at rest or while moving, so that it is possible to in hauling road building materials.

Kelly, Kelly Motor Truck (Impany, Springfield, O. Oneton chassis, one-ton open express, three-ton express, and two-ton chassis fitted with 12-passenger hotel 'bus. In the smaller model, the motor is in front under a hood, while in the larger vehicles it is under the floor. Driver is at the left with central levers. All models are fitted with a governor. Practically no change has been made in the line, the been improved in a number of minor details.

Knickerbocker, Knickerbocker Motor Truck Manufacturing Company, New York City. Three-ton screen side brew-



Impressive Showing Made by the Product of the Goodyear Tire & Rubber Company.

ery wagon and four-ton coal dumper. Motor is under the floor, with driver and levers at the left. This is a new product which has a number of distinctive features, chief among which is the method of mounting the motor and the provision made for its removal and replacement.

Beginning at the radiator, which is of the honeycomb type and suspended on springar or stanchious which are attached to or supported on the bumper, it will prove of laterest to note the provision for accessibility. The bumper is binged so as to swing open, carrying the radiator clear, so that the mort may be drawn of all it, is suspended on a hickory sub-frame, which may be drawn out as a drawer is willightness from a deek.

The clutch, a leather faced cone, also may be removed in 15 minutes, and the same holds true of the transmission, which is of the selective type, giving three speeds forward and reverse. This removability is still farther extended to the lackshaft, of the full floating type, in a one-piece presend steel housing. Still another feature is the piecus of two, cell spirings directly under its the piecus of two, cell spirings directly under a distance of the case of over-

Labrication of the motor is by means of a positive gear driven pump located at the bottom of the commutator shaft and contained within the lower crankcase. The oil is filtered

and forced through tubes to the main bearings and crankplis. A cup projection on the connecting rod case pickes plushricant on every revolution and further assists in caring for the bearings. The oil level is shown by a ball in a gauge at the side of the crankcase. An overflow is provided which is held to eliminate flooding and smoking.

Koehler, L. E. Selhotterback Manufacturing Company, Newark, N. J. One 1800-point planel delivery wagan and two panel bodies. Motor is under the chassis, with driver at the left and the levers at the right. This line is marked by the H. J. Koebler Company of New York City, and is entirely new forms.

The motor is a two-cylinder, four-cycle, water-cooled, opposed unit, with bore of 5.25 inches and stroke of four-labrication is mechanical and integral. Cooling is by thermosyphon, through large pipes and large radiator at the front. The carburetor is of the float feed type. Ignition is jump apark with true high-reasion Splittori magneto, the instrument being located on top of the motor and driven direct by enclosed gears.

Byte is in a direct line from motor to Jackshaft, immediately connected by universal joint. Final drive is through double side chains to rear wheels. Transmission is of the jackshaft, menal to metal with 75 square inches of braking surface and at a three-to-one reduction from the rear

wheels. Emergency brakes also are metal to metal, operated independently.

Frame is channel section steel.
Frame is channel section steel.
If is from and full filling is rearfrom and full filling is rearfrom and full filling is rearfrom the filling is rear
from the filling is rear-

Lauth-Juergens, Lauth-Juergens, Motor Car Company, Fremont, O. One-ton flare board express, and three-ton high side pare at press, and three-ton like gate at the right. A particular feature of the exhibit was the driver's cab on the three-ton model, tils being completely enclosed with glass windows on all sides, giving the from the weather.

The motor is a Ruteuber four-sylinder, four-cycle, water-coied unit. Lubrication is by shades system. Ignition in by Bosch or Mea high-tension magneto and battery. The clutch is the firm's own patiented, three-piece disc member, having only three parts, and consisting of two metal discs between which is not to be supported by the consistency of the property of the consistency of the consist

The transmission is of the selective sliding gear type, giving four speeds forward and reverse. This also is the firm's own patented device, and is housed with the jackshaft as a unit. Four semi-elliptic springs from and rear are made of chrome-vanadium steel. Axics are heavy, solid steel forgings with heavy steering yokes and ball bearings throughout. Emergency brakes are contracting on drams on jackshaft, while service members are in Wweels are 38 inches in diameter, equipped with five-linch solid tires in front and four-linch dain members in rear.

Lippard-Stewart, Lippard-Stewart Motor Car Company, Buffalo, N. Y. Chassis, panel delivery and open delivery, all of 1500 pounds capacity. Motor is in front under a hood. Driver is at the left with centre levers. The start ling feature of the display was the "golden chassis," on which the parts had been so skilfully gilded as to leave nothing in its original color except the tires.

Accessibility and the elimination of parts which might cause trouble in the hands of an inexperienced operator are among the chief claims for the Lippard-Stewart. Each unit is so arranged that it is possible to remove and replace it without disturbing any other unit. The small four-cylinder motor, and the low geared (increasing the start of the make a combination which is beld to give a surplus of power for all occasions with a remarkably small consumption of gasoline and oil. Pixed ignition is another attempt to return compilications.

The radiator mounting follows foreign practise, in that it is mounted behind the motor at the dasb. Reduced without tion is provided by suspension on colied springs. The water pump is eliminated, as well as the belt driven fan, suction hindes on the flywheel taking the place of the latter.

The selective sliding transmission provides three speeds forward and reverse, and is located immediately under the floor boards, where it can be removed easily should occasion require. Instead of the chain drive construction a shaft drive and full floating rear as a are employed. The cultural rate to the construction as the construction of the rear asia.

Maxim Tricar, G. H. Bushnell Press Company, Thomp-

sonville, Conn. One tricar, fitted with two-cylinder, air-cooled vertical motor, mounted over the front wheel. Although described as an air-cooled engine, a pair of hollow ribbed columns containing water is provided for cooling the exhaust valves.

The particular feature of the construction is the speed changing device, which is of the hydraulic type. A small cylinder-like compartment, somewhat smaller than the crankcase of the engine and carried on the extension of the crankshaft, is filled with oil. When no power is to be transmitted, the vanes on the shaft disc are folded. and if the motor be started then the disc and its vanes will churn ldly in the oil. When the bandle is turned upward so as to open the vanes, the oll starts circulating in the casing being thrown violently from the pockets formed by the movable vanes into those formed by the fixed members, and imparts

to the latter, and of course to the easing, the sleeve and the statched sprocker, chain and the front where of the ear, a rotary motion. When the movable vanes are raited still rurher, there is more violent earlier of the oil, which is thrown with great force and more power is transmitted, until to fail opening, when there is just room for the mans to slear each other, the sharf dise and the sprocker carrying casing rotate aimost together, there beling a very small amount of slip or lost motion.

Modern, Bostling Green Motor Car Company, Bowling Green, O. One 1500-pound classis, one 1500-pound open body and one 1000-pound screen side body. Motor is in front under a hood, and driver either at the right or left, with right hand levers placed accordingly. This is another new product, so far as the New York shows are concerned, and is made only in the light delivery class.

For the smaller wagon the motor is rated at 25 horseiower, and for the larger 30. Both are of the block type with all valve mechanism enclosed, and water-cooled by forced circulation. The latherating system includes a positively driven panny with sight feed on the dash, trive is packahaft and side chains to rear wheels. Pneumatic tires are fitted as standard equipment, but solids may be had if preferred.

Motor Wagon, Motor Wagon Company of betroit, Deroit. Three-seated bus, stake platform, panel delivery, open side flare board, open side with top, and chassis, all of 800 pounds expactly. Motor is in front under a hood, and driver at the left with centre levers. This vehicle also was shown for the first time.

The motor is a two-cylinder, two-cycle, water-cooled, horizontal opposed unit, with bore and stroke of four incherated at 16 borsepower. Cooling is by thermo-syphon. Lubrication is by positive mechanical sight feed oiler. Ignition is by Bosch high-tension magneto with fixed super-

The transmission is of the planetary type, with aelt-contained multiple due clutch, the entire assembly being mounted on hall and roller bearings and enclosed in an oil tight case. Three speeds forward and reverse are obtained. Drive is by double side chains from jackshaft to rear wheels. Frame is of seriel, channel section. What is calmed to be a three point spring suspension is employed, this comprising one set of semi-stilled members in front and two fall elliptic in the rear. Wheels are of the artillery type, 22 inches in diameter, fittle with two-inch solid tires in front and 2.5-inch solids in the rear, although pneumatics may be had at an extra charge.

Newark, Newark Automobile Manufacturing Company, Newark, N. J. One 1000-pound chassis, one 1500-pound



Where I nited States Tires Were Exhibited in the Accessory Highless,

panel delivery wagon and one 1.5-ton chassis. Motor is in front under a hood, and driver at the left with centre levers. This new truck has a number of distinguishing features, chief among which may be mentioned the worm drive.

Everything about the car is euclosed. The motor is a four-cylinder unit, cast en bloc, with all working parts euclosed, the covering of the vaive mechanism being the first step in what is claimed to be a special effort to reduce excessive noise. The leather faced cone clutch rans in oil. The three-special electric reported is carried in a radius which the motor crank-ase, making a complete unit. The worm and gear are imported from abroad.

On the seering column is a little trass cylinder from the top of which rises a small red with a bull shaped head. When the motor is running and the oil is circulating active by, the pressure of the lubricant, communicated to the little cylinder through connecting pipes, keeps the ball ended red pressed up and the driver can determine at a glame, that press has a surface of the latter of the column of the column trees has finer on the ball, and if it he down, either the oil is exhausted or something cles is wrom.

The enclosed feature is extended to the ends of the semi-

elliptic springs and joints, which are protected to metal.



Decutur Sent and Dash Luits Dismounted to Hinstrate Accessibility of Power Plant,

hoods, which exclude all dust and retain lubricating grease. In fact, this attention to detail in this regard, throughout the entire mechanism, has been carried to an extreme.

Parkers, Farkers Motor Truck Company, Wheeling, W. Va. Two-ton chassis and two-ton panel butichers' was. Motor is in front under a hood, with driver and levers at the right. The line also includes a four-ton model, which was not shown. Standard design has been followed throughout.

The motor is a four-cylinder, four-cycle, vertical unit, was considered and with infet and exhaust valves on opposite sides, mechanically operated. Lubrication is by force freed to all crankshaft and camabath hearings and splash for concetting red and cylinders. Ightition is by dual system. Splitdorf low-tension magneto and Splitdorf non-vibrating coll on the dash.

The clutch is a Hele-Shaw multiple disc. Transmission is selective with three speeds forward and reverse, and is mounted on the Jackshaft, both being on a three point suppension. Final drive is by double side chains to rear wheels. Frame is of steel, channel section, heavy reinforced in the centre. Springs are long and wide, of sibronaganose steel. From take he are long and wide, of sibronaganose steel. From take he are long to the complex of the contract of the contracting type on the jackshaft and the emergency on the rear where

Poss, Poss Motor Company, Detroit. Chassis and panel delivery wagon, both of 100 pounds capacity. Motor is in front under a hood with driver and levers at the right. This is another new make employing the friction transmission.

The motor is a four-cycinder, four cycle unit, with bore of 3.5 inches and stroke of 4.75, and cylinders cast en bloc.

This is hung on brackets bolted directly to the main frame. The driving disc is carried in bearings in a cross frame and the shaft of the driven disc is supported on the main frame. Final drive is by single chain to the live rear aske, Solid tires are ditted as standard, although pneumatics may be had if preferred.

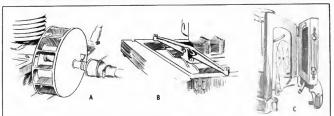
Row, Rome Metter Company, Contestille, Penn. One Tourpound waron with side seats and one 2-tou-pound high side souts and to body with hand operated winch for handling some. Motor is in front under a hood, with driver and levers at the right. White these cars are offered with a worm of the state of the state of the state of the stated that the bushess of the stated that the bushess of the

stated that the business of this concern is rather the manufacture of motors, and the production of trucks is undertaken on special order, the claim being that it is impractical to construct a line of stock models which will meet the varied requirements of individual users.

The motor is a four-sylinder, four-sylinder, converyels, water-cooled, vertical unit, with inlet and exhaust valves on opposite sides. Extreme care has been taken in the design so as to protect all moving pairs and bearings from dust and to prevent oil from leaking out. All attachments are so placed as to be easily accessfulls. Magneto, oll and water pumps are generally accessfulls. Magneto, oll and water pumps are generally accessfully accessfully distributed by general retinents, foreign the oil through ducts drilled into the crankshaft to each of the crankshaft and connecting rob bearings. Oil thrown off by the movement of the cranks lubricates the walls of the cylinders, canshaft and gears, valve tappets, exive tappets and exive tappets.

The multiple disc clutch runs in oil. The transmission is of the three-speed selective type. Two complete acts of brakes are fitted on the rear wiscels. The service members are external contracting and the emergency, increal expanding. Frame is of pressed chrome-nickel steel, channel section. Springs are semi-chipto in from and pixticent acts of the contraction of the purchaser, the choice being governed by the service which is expected of the completed vehicle.

Sanford-Herbert Company, Syricus, N. Y. Chassis, open flare board body and express, all of one ton capacity. Motor is under the floor, with driver and levers at the right. This make has been known as the Sanbert, the name being taken from those of the pracingal stockholders in the company, but the public has so often confused the name of the car with the first portion of the firm name than



 Few Mechanical Features at Grand Central Paince Dispiny; A. Chase Fan Flywheel; H. I niversal Motor Support; C. Kalekethocker Hadiator Mounting.



Radiator I ader Driver's Scal on Laiversal.

it has been decided to accept that verdict and it will be known in the future as the Sanford. The motor is a three-cylinder, two-cycle, air-cooled unit,

with hore of four inches and stroke of 4.5, rated at 25 horsepower. Ignition is by Bosch high-tension magneto. The planetary change speed gearing is employed, and the gearcase is attached to the forward side of the lackshaft hous-Final drive is by side chains to the rear wheels, which are 38 Inches in diameter, fitted with 2.5-Inch solid tires. A belt driven fan furnishes air circulation when the motor te suppine

Schneht, Schneht Motor Unr Company, Cincinnati, O. One three-ton flare board express wagon. Motor is located in front under a hood, and driver at the left with centre levers. Although on the market for the past two years the Schacht was first displayed in New York at this show. The line also includes two and four-ton models, but in all essential characteristics they are the same. Few changes in merbanical construction are to be noted, the solid, substantial heavy duty type of vehicle with plenty of power and transmission systems well able to convey it to the rear wheels having demonstrated its satisfactory design under all circumstances in the past

Sullivan, Sullivan Motor Car Company, Rochester, N. Y. Haif-ton panel delivery wagon and 1500-pound flare board body. Motor is in front under a hood, and driver at the

left with centre levers.

The engine is a two-cylinder, four-cycle, water-cooled, horizontal opposed unit, with bore and stroke of 4.5 inches, rated at 18 horsepower. This is suspended by cylinder head brackets from the main frame. Cooling is by thermo-syphon. Lubrication is by mechanically operated oiler, pumping oil to each of the cylinders, main bearings and direct to each connecting rod bearing. The crankshaft is drilled to allow the jubricant to be pumped to the latter. Valve operating nuchanism is oiled by splash. Ignition is by Bosch magneto

The transmission is of the planetury type. Clutch is of the cone type. Final drive is hy side chains to the rear wheels. Brakes are equalized internal expanding members on rear wheel drums. Frame is of angle steel, hot riveted and securely braced at corners and with cross braces, Springs are full elliptic in front and full elliptic scroli in the rear. An auxiliary spring also is fitted at the rear. Tires are solid, 36 by 2.5 inches front and rear.

Universal, Universal Motor Truck Company, Detroit. Chassis and two warehouse trucks, all of three tons capacity. Motor is under the floor with driver and levers at the right. A particular feature of this line is the mounting of the radiator, which is behind the mutor, on springs under the driver's seat.

The motor is a four-cylinder, four-cycle, water-cooled unit, with bore of four incire and stroke of 5.5, rated at 30 horsepower. Lubrication is by the self-contained, constant level splush system, from main reservoir to the plunger pump to sight indicator on the dash. Speed is controlled by an automatic governor of the ball type, acting directly on the main throttle control. Ignition is by jump spark. current being supplied by a Bosch dual magneto.

The clutch is a multiple disc of the dry plate type. Transmission is selective sliding, with three speeds forward and reverse. Final drive is by side chains to rear wheels. Frame ls of steel, channel section. Service brakes are external contracting on brake drum located on the jackshaft and integral with the differential case. Emergency members are internal expanding in rear wheel hub drum. Four semielliptical springs are employed. Front axle ts an I beam section, while the rear member is a heavy rectangular sec-Wheels are 36 inches in diameter, fitted with five-inch single solid tires in front and four-inch dual in rear.

Veerac, Veerac Motor Company, Anoka, Minn. Chassis and carpet house wagon with high side panel and standing top, both of 1500 pounds capacity. Driver is located at the left with left hand levers. The name of this car is made up from the initials of the words, "valveless explosion every revolution, air-cooled," and the power plant is accurately described thereby, it being a two-cylinder, two-

cycle, air-cooled, horizontal opposed unit.

This is hung crosswise of the frame and bas two separate and distinct throttles, one for each cylinder, controlled by two throttle levers on the steering column. This is held to make it possible to control the engine, either by throttling down one or both cylinders at a time, or cutting out one member and running the power plant as a one-cylinder motor. The throttle valves are at the intake ports of the cylinders, thereby eliminating the possibility of disturbing the action of the carburetor.

Another feature is the installation of a pipe leading directly from the gasoline tank to the cylinders with a shutoff cock operated from outside the frame. By opening this cock for a moment gasoline is injected into the cylinders and starting is thereby made easier, it is claimed.

Velic, Velie Motor Vehicle Company, Moline, III. ton chassis, three-ton low stake body and 1500-pound delivery wagon. Motor is in front under a hood, with driver and levers at the right. Although by no means a new product, this was the first time it was shown in New York City. In the main, the construction follows standard design, incorporating only such features as have been tried out thoroughly and found satisfactory under all conditions. A Prest-O-Starter and governor are fitted as regular equipment this year.

One particular feature is the differential lock, by means of which it is possible to depress a pedal on the foot board and lock the mechanism so that the rear wheels turn as if on a solid axie. The design of the radius rod also is unusual. Instead of being rigid when subjected to endwise pressure, this is made with telescoping joints held open by



Radintor Behind Motor on Lippard-hievart. GOOGIC

heavy belical springs, so that the sudden application of power, instead of transmitting severe shocks, is cushioned. Victor, Victor Motor Truck Company, Huffalo, N. Y.

Two-ton warehouse truck. Motor is in front under a bood



speed Reduction Genebox for Electrie Motors

with driver and levers at the right. Although the full line includes a number of models, few mechanical changes are noted over past years, the construction having been such that It has given ahundant satisfaction under varying degrees of service. A multiple disc clutch is fitted as standard. although a cone clutch will be substituted if desired. Walter, Walter Mo.

tor Truck Company.

New York City. Three-ton chassis, three-ton furniture wagon and five-ton chassis. Motor is under the floor with driver and levers at the right. The principal feature is the adoption of the new Westinghouse change speed gear mechanism, which will be standard in all future productions of the company.

In this, which gives three speeds forward and reverse, the gears always are in mesh and are engaged by individual clutches of the multiple disc type mounted on concentric sleeves, and operated by the progressive movement of a lever, which engages the clutches in succession. The first movement of the lever compresses the discs of the low speed clutch, which is caused to rotate, carrying with it a sieeve, on the opposite end of which is a gear meshing with a countershaft gear. Further along the countershaft another gear engages with a gear on the tailshaft, which is connected by a universal joint to the propeller shaft.

Further movement of the operating lever carries the compression further, and the second clutch is engaged, without releasing the first, however. The second clutch drives another sieeve inside the first, and it also carries a gear and drives the countershaft and talishaft in the same way as the first speed gearing, the difference being that the gears in the second set are proportioned to give higher speed at the tailshaft.

In order to prevent locking, the driven gears on the countershaft are on roller clutches, so that when the second speed is engaged the first speed roller clutch overruns. On third speed, drive is direct, first and second gears on the countershaft overrunning on their roller clutches. When speeds are changed with this gear the transition from one to another is said not to be perceptible. The entire mechanism, including the clutches, is enclosed in a single casing, and the shafts and sleeves run on annular ball bearings.

ELECTRIC COMMERCIAL VEHICLES.

Argo, Argo Electric Vehicle Company, Saginaw, Mich. One 1000-pound chassis, one 1000-pound panel delivery, and one one-ton low side panel delivery. This new line was notable because of the manner in which the motor, a Westinghouse ironclad type, and transmission are combined in a unit. Drive is through a short shaft and herringbone gears.

The hattery, provided to sult condition of use and preference of the purchaser, is underslung amidships. Control is located on the steering mast, interlocking with ratchet brake, so that the latter cannot be set with power on, or power applied with brake set. This is claimed to be a distinct Argo feature.

Hupp-Years, Hupp Corporation, Detroit. One screen side delivery of 1000 pounds capacity. This is a new addition to the Hupp-Yeats line, although the chassis does not differ materially from that of the well known pleasure vehicle of the same make, except that it is slightly changed in shape and somewhat heavier throughout.

Waiker, Walker Vehicle Company, Chicago. One 750-

pound chassis, one 750-pound screen side delivery, and one 1.5-ton panci delivery. Internal drive with all gearing enclosed in the disc rear wheels; a single electric motor with its shaft extending across from wheel to wheel, each end of the motor shaft driving a wheel, and a differential in the motor shaft are the principal features of the line.

The motor is enclosed in a hollow casing which forms the rear axle. On either end of the shaft is a small spur pinion which meshes with two large gears, the latter in turn meshing at diametrically opposite points, with a large internal gear secured to the inside of the wheel rim. The two intermediate gears turn on studs on opposite ends of the yoke, which is mounted on the end of the hollow axie casing projecting into the wheels.

Owing to the peculiar construction of this rear axle the motor is extremely accessible. The upper portion of the casing is removable, when six capscrews are taken out, and the whole of the motor with differential on the shaft, may be examined

IANUARY GENERAL VEHICLE SALES.

It will prove of interest to note that the January sales of General Vehicle electric trucks, made by the General Vehicle Company, Long Island City, N. Y., totalled 158 Jacob Rupert, a New York brewer, ordered 21, making his fleet 72 in all. Peter Doeiger, another New York brewer, ordered eight, making a total of 47. Other large orders were: Muchiback, seven, making 10; Commonwealth Edison, nine, making 15; Schaefer Brewing Company, eight, first order; General Baking Company, 10, initial order. Sixty-nine per cent, of the 1911 business of the company was reorders, and Feb. 1 finds it with 671 General Vehicle electrics bought by 25 customers alone.

BRITISH CARS USE COVENTRY CHAINS.

There is a growing tendency abroad to adopt a noiseless chain for driving the camshaft, magneto and pump of the power plant and many of the best known English makes displayed cars thus equipped at the recent Glasgow motor exhibition held recently. Not only is the chain drive being utilized in the motor but also in transmissions, etc.

Among the exhibits of interest at the Scottish show was the display of the Coventry Chain Company, Ltd., Coventry, England, of which S. Hoffnung & Co., Ltd., 118 Broad street, New York City, is United States representative. The compiete product of the British concern was shown, as well as a chain driven change speed gearbox which attracted considerable attention at the Olympia show and which is depicted in an accompanying illustration. This design makes for silence and efficiency and is being tested by American manfacturers with a view of application to their cars. In Germany a plant is being erected to produce the gearbox for supply to the motor builder.

The application of the stient chain to a speed reduction gearbox is shown in the illustration herewith and it is claimed that the design solves effectually the question of re-



Coventry Notseless Chains Fitted to Change Speed lienthog ducing speeds of electric motors to the desired number of revolutions with a minimum loss of power, by either double, trehie or quadruple reductions. In addition to efficiency, silence, reliability and longevity are emphasized.

MIDDLE WEST AWAITS CHICAGO SHOW.

EACH year the importance of Chicago as a centre in which to make display of commercial vehicles has been appreciated more and more by the manufacturers. there was some question regarding the advisability of holding a separate show for this type of automobiles in New York City in 1911, there was little doubt in the minds of those who had studied the field that the second attempt of this nature would prove successful in Chicago. It must be remembered, in this connection, that the metropolis of the Middle West was the first city in the country to inaugurate the scheme of holding an exclusive motor truck exhibition. But that was some years ago, when this branch of the industry had not as yet been fully recognized as a separate institution, and the attempt was largely in the nature of a failure. However, the industrial transport show of 1911 was a decided success from every point of view. and there is little question that the event which will be held in the Collseum and First Regiment Armory, Feb. 3-10, will be even more so.

The second annual motor truck display will be under the auspices of the National Association of Automobile will see no less than the same number, and all in one exhibition, alber both structures will be utilized in the display of trucks this year, whereas the Collecum was found wholly adequate for this purpose in 1911. Incidentally, it may be mentioned that this number is based upon advance reports, and it is known that several other makers have secured space within the last few days, so that the 1912 Chicago exhibit will be far the largest showing of industrial transports ever assembled in any city. There were 5.7 different concerns represented last year.

It is well to note that many makes will be shown which were not seen in New York. Included in this list are the following. Adams, Avery, Chicago, Clark, Diamond T., Dorris, P.C.S., Four Wheel Drive, Mais, Mercury, Monitor, National, Old Reliable, Rambler, Rassel, Service, Smith, Staver, Stegeman, Sternberg, Intled States and Wilcox.

SPLENDID SETTING AT MILWAUKEE.

The Milwaukec Automobile Desiers' Association, Milwaukee, Wis., held a combined showing of pleasure and



Exterior of the Colliseum at Chicago, Scene of the Second Annual Separate Show of Commercial Vehicles in Middle Western Metropolis.

Manufacturers, and the direction of S. A. Miles, who has managed all of the automobile shows held in the Collseum, and the construction of the control of the conservation of the commercial time, nor of a sequence character. The interiors of these was unfulfage lend themselves admirably to the decerative are

It is announced that the treatment of the Coliseum will be purely architectural throughout. The gliders will be hidden by a monaic design, relieved here and there by mural paintings, the whole effect being light in color, white, amber and gold predominating. The two end walls above the gallery will be covered with immense drop curtains. The building will be likely do 36 large chandellers.

The main floor of the armory will be transformed in much the same manner as last year. Staff walls, pillars and vases of the Louis XIV design will be combined with flowers, foliage and ornamental lamps. For the first time, the ceiling will be flat instead of circular. A drop curtain running from the second to the third gallery will surround the entire structure.

There were 72 different makes of machines displayed at the two shows in New York City last month. Chicago

commercial cars in the Auditorium in that city, Jan. 13-20. The Interior of the huilding was converted into a garden within a wall, on which was entwined vines and Alabama smilax, making a decidedly attractive setting. The truck section was most complete in every way, practically every lime represented in the city being above. In explicit the very interpretable of the city of the properties of the city of the control of the city of th

Thiernal Machinery Company, Tiniversal; Buick Mottor Company, Rulek; American Locomotive Company, Aleo; Crown, Commercial Car Company, Crown; Orrin R. Hughes, Garford; Jos Obernberger & Sons Company, Monitor; Peerless Motor Car Company, Peerless; Riedessor Motor Taruk Company, Controlessor; Carlie Automobile Company, Rev., company, Chase; II. F. Dower & Co., Menumines, Johnson Service Company, Johnson Service Company, Johnson Service Company, Johnson Service Company, Steepens Motor Car Company, Packard, Steepens Motor Car Company, Pierce-Arrow; Bates-Odenbrett Automobile Company, Wilselfar; American Automobile Company, Wilselfar; American

PLANS FOR BOSTON'S FIRST TRUCK SHOW.

NDICATIVE of the rauld development of the commercial vehicles is the separate display of business wagons when will be held in Nechanics' building, its proton, March 13-26, while the held in Nechanics' building, its proton, but the pleasure care exhibit, but the progress of this branch of the dudnery has necessitated a separate above, the demand commercial motor which cannot be part of the manufacturers leading the Busina Commercial Motor Vehicle Association to devide upon this step. The management is under the personal direction of Unoter 1

The unusually large attendance at the New York displays of commercial ears is a forecast of the sacress of the loston event and it is anticipated that the Mechanics' building will be taxed to its utmost to accommodate the numerons designs. Many makers who were unable to secure space at the metropolitan shows will be represented at libration. The entry list includes all types of commercial vehicles from the tayp parel delivery wagon to the 10-ton track, and machines designed for every industry will be represented, as well as automobiles for mulcipal service. The result of the careful study and experimentation of the manufacturer during the pass query will be everaled in ascerta hoddes cononstrate the superiority of the automobile over the horse drawn equipment.

TOLEDO'S THIRD ANNUAL DISPLAY.

The commercial vehicles were shown with pleasure cars at the third annual exhibit of the Toledo Automobile localers' Association in the Terminal building, Toledo, O., Jan, 15-20. The exhibitors of motor trucks follow.

Atwood Automobile Co., Overland, Garford, G. M. C., Federal; Banting Machine Company, Grafowsky, Rambler Moner Sales Company, Betroit electric; Northern Ohlo Motor Var Company, Betroit electric; Northern Ohlo Motor Var Company, Ford; H. J., Adams, Rev.; Roberts Toledo Auto Company, Ford; H. J., Adams, Rev.; Grasser Motor Auto Company, Ford; H. J., Adams, Rev.; Liraser Motor Creery Manufacturing, Company, Oliver, James F. Locke, Adams; Morrill Company, Kells.

OPEN AIR EFFECT AT PROVIDENCE.

The State Armory in Providence, R. I., was utilized by

the Rhode Island Licensed Automobile Dealers' Association for its revival of motor car shows in that state, Jan. 22-27. it is four years since the people of Rhode Island had opportunity to inspect the different models in an exhibition of this character, but this was the first attempt to hold a display under the direct management of the association. Its splendid success presages an annual event in the future. The deccrations were such as to give the impression of an open air park, in which the vehicles were displayed with splendid effect. Much business was transacted through the week.

Those who made display of commercial velicles were: White, Binlord & Roblinson Moor Car Comjuny, White; Illicheck-Ranks Motor Car Company, Resex, Foss-Hughes Company, Plere-Arrow; Klasel-Kar Company, Reservant, Research William Hughes Commany, Research William Hughes Commany, Research Brow, Morgan; American Locomotive Company, Aleo; Autora Sales

& Service Company, Autocar; Alvan T. Fuller, Packard; B. F. & A. W. Hopkins, International Harvester; Davis Automobile Company, Gramm; Rhode Island Motor Car Company, Pope-Hartford; Teel Manufacturing Company, Teel-Woodworth.



Attractive Exhibit of White Trucks in the Foreground of the Commercial Vehicle Dispin Bros., Morgan; American Locomoat Previdence, R. I.

structed to meet every requirement and these will include dumping bodies which are operated by the driver without the latter leaving his seat.

The rapid development of mechanically propelled are apparatus will prove interesting to municipal authorities and as a large number of different types will be exhibited these will attract those considering the displacement of the borse drawn equipment. Army wagons, ambulances and omnibuses will be found in large numbers as well as numerous types of vehicles especially designed for light delivery work.

Not only has progress been made by the manufacturer in the refinement of body designs but a great many improvements in the mechanism of the machines will be noted. New thickes in transmission will be exploited as well as manufactured as well as manufactured as well as manufactured by the consoning of the market for reliability and economy.

The commercial vehicle show will be a splendid object lesson, and the business man will recognize the value of its economic side, to say nothing of the worth of the automobile in service. The indications are that the power wason show will share equally with that of the pleasure car event in the matter of attendance and business transacted. That New England is a promising field for the development of the Boston shows will afford him an opnorutative to demotate the state of the

EXHIBIT OF DETROIT DEALERS.

While trucks were shown in connection with pleasure cars at the annual display of the Detroit Antomobile Dealers' Association, in the Wayne Gardens and annex in that city, Jan. 20-27, they made a most creditable impression. Insamuch as the original structure was found too small to accommodate all who wished to make exhibit, permission was received for the erection of a temporary annex.

The following displayed power wagons: General Motors Truck Company, G. M. C.; Commerce Motor Car Company, Commerce: Ford Motor Company, Ford; Insted Motor Detroit Company, Sampson; Seumann-Lane Company, Pierce-Arrow; Havers Motor Truck Company, Havers; Motor-Wag-on Sales Company, Motor Wagon; American Steam Truck Company, American steam; Poss Motor Car Company, Poss; Grabowsky Dower Wagon Company, Grabovsky Power Wagon Company, Grabovsky Pose; Motor Truck Company, Seltz; Durant-Dort Carriage Company, Best; Kisselkar Company, Kisselkar.

· Carrie

TWO BUILDINGS FOR PHILADELPHIA.

For the second time in the history of automobile shows in Philadelphia, a separate week was devote to the duplay of commercial vehicles in the Pirst and Third Regiment Armories, Jan. 32-27. In the former building the trucks shared the space with electric pleasure vehicles, and in the latter with accessaries. The interior of each was hand-nonely decorated, and the fullest opportunity was afforded those who destred to inspect the mechanical features.

The makes shown in the Pirst Resiment Armory were: Amorgan, Irush, Carterar, Commer, G. M. C., Gramm, Killy, Mercury, Morgan, Peerless, Sandusky, Seltz and Speedwell, Those in the Third Regiment Armory were: Chase, Walker, Waverley, Mais, Commercial, Sampson, Pierce-Arrow, Aloc, Knox, Dackard, Reo, Philadelphia, Furd, Logier, Baker electic, Cameron, Mack, Saurer, Locomobile, White, Kisselkar.

WILL HANDLE COMMER TRUCKS.

Announcement is made by Wyckoff, Church & Partridge, Inc., New York City, that an agreement has been entered into with the Transportation Sales Company of that city which involves the purchase by the latter concern of Commer and upon to perform such efficient and constant service. Operators of motor trucks sometimes are hedined to under estimate the attention necessary to be given to the mechanical features. There but the same "pride of appearance" feeling that exists with the chanfleur of a pleasure car, and as a result the entire truck may be made to suffer from instruction.

It is generally accepted that two-thirds of motor troubles, for instance, are caused by Improper lubrication. This is a de-idedly important consideration, Inasuuch as the engine of a commercial vehicle is called upon to indered heavy duty service throughout its entire life. It follows that it must necessarily possess wearing qualities, which cannot be retained without the very less lubrication, and salide engine roundle is the proper selection of all. It is poor economy to cumploy an infectior grade, simply because it is offered for less money.

Those who have made a carrful study of the subject on are agreed that the proper oil for motor truck lubrications should have, first of all, the right body or viscosity, and this must be such that it will not be affected materially by the perature changes. From the high heat of the cylinder to the lower in the crankesse, it must maintain a sufform to



interior of the First Regiment Armort Buring the Progress of the Power Wagon Exhibition at Philadelphia

Guy Vanghan cars to the extent of over \$1,000,000. The new company will operate from the present location of Wyckoff, Church & Partridge, Inc., the latter retaining space in the same building for its general and executive offices. The plans of the new concern include the erection of a sixstory building, in which will be installed a complete repair shop and service department. The structure will also include a large public truck garage with spaces and accommodations for at least 200 machines. A feature of the service will be an agreement to maintain free of charge for one year all repairs to Commer vehicles, tires and accidents being excepted. The Transportation Sales Company is composed of expertenced automobile men and engineers fulls capable of dealing with the New York situation, and its taking up the sales of Commer cars is in keeping with a plan outlined some time ago by representatives of the English product

LUBRICATING THE COMMERCIAL CAR.

Inasmuch as the business world is rapidly recognizing the economy effected by commercial motor transports, it is essential to consider the matter of providing safeguards against delays and repairs to the vehicles which are called of flow and, at the same time, its lubricating qualities. It is must have a fire test that will permit it to burn up rich to burn up rich play at the properties of the properties of the properties of the cannot be accomplished if it contain free carbon. This latter the be removed only by a process of mechanical filtration which is expensive.

While there are oils on the market that will perform properly the services called for in a motor truck, the Bayes properly the services called for in a motor truck, the Bayes line Oil Company, New York City, recently concluded practical working tests, which have resulted in the offerings of a new brand under this well known firm name, to be known as Havoline motor truck oil. In the pregaration of this, special attention has been paid to securing all of the qualities newsaway for commercial whelter labeleath to findicate that it is a satisfactory product for all requirements.

At the shows a very novel souvenit was given away at the Havoline booth. It consisted of a fije-saw purzle which when put together, portrayed an aeroplane, automotie and motor boat. When the puzzle is solved and delivered to one of the stations of the Indian Refaining Company, 17 Battery Place, New York City, distributor of Havoline edit, the possessor is entitled to a valuable book of tours, compiled by an substitution.

Dia Red by Google

SALES METHODS WHICH SECURE REORDERS.

By P. D. Wagoner, President General Vehicle Company,

O NE of the most encouraging features of the motor truck industry of today is the increasing number of large orders received by manufacturers. These indicate in a substantial way a recognition of the value of the commercial vehicle and a confidence in the present day product. Furthermore, as many of these large reorders are from consistent users of the truck or wagon in question, they indicate also that the customer is convinced, after a practical test, that his inital motor truck investment was a paying one.

Almost before we have had time to realize the keen, nation-wide interest in the motor truck many of our large firms are saving among themselves, not-"Shall we 'try out' a truck?" but-"How many trucks shall we buy? There are many phases to this question of buying trucks in quantities, and I have always watched "first installations" with much Interest

It seems to me that other things being equal the size of the first order depends largely upon the ability of the buyer to fully realize on his investment. If the buyer is a



mon to our great express companies, department stores, packers, brewers, etc., a sudden and radical change can more safely be made in the method of delivery, because the organization is in a position to come with the new conditions and requirements which arise. With the smaller huyer this is not always true and some eaution in buying Is necessary in order to avoid confusion and unnecessary expense in operating power vehicles. I believe all

P. D. Wagoner, President General broad a minded bustness men will concede the fairness of this suggestion.

The transition from the centuries-old method of horse and wagon delivery to the 20th century method of motor truck delivery should here be done systematically and step by step if real efficiency and economy are to be secured and maintained. Motor trucks should not be measured by horse wagon standards. And what is more important from an efficiency standpoint, the system behind the loading and routing of horse drawn wagons should be wholly reorganized and the pace accelerated when the faster and surer power vehicles, independent of weather and of flesh and blood limitations, are substituted.

With perhaps 40 per cent, of our output to date or, specifically, 1600 vehicles distributed among less than 100 customers, our reorder experiences have been very extensive. Over 69 per cent, of our 1911 output went to customers already using our vehicles. We attribute our success in selling fleets, or in getting reorders, which is the same thing eventually, to our policy of selling most of our customers, first, a nucleus to work with and to build a foundation, and, then, when they have thoroughly tried out, say from two to 10 cars and readjusted their delivery system to meet the changed conditions, putting in our vehicles in fleets and from 10 to 25 at a time until their existing transportation needs are comprehensively supplied.

Large orders can best be secured on a basis of mutual

confidence, patience and co-operation. I believe the reason we do not have larger motor fleets in some lines of trade today is because in the too frequent ambition to sell a customer as many trucks as possible in the shortest space of time, due consideration is not given to the needs of his particular business in his particular locality or environment. If the selling organization interested would study to give each customer just the truck or wagon or the number of each which he needed at that stage of his conversation and facilities, we should see more satisfied customers at the outset and larger reorders later on. Progressive expansion is what is needed-not a wasteful upheaval of a delivery structure developed through years and years of gradually increasing business.

On the other hand the great truck fleets in successful operation today-and by the word "successful" I mean dividend-earning-are but a handful of what we will see in less than another decade. Shrewd, far-seeing business men are more and more being converted to the use of the motor truck and just in proportion to the proven value of the first, perhaps, very modest installation will their confidence grow and will they reach for their pen to sign reorder contracts. Hysterical, "hurrah boys" methods may sell pleasure cars to care free recreation seekers, but they are out of place in selling business cars, just as slipshod methods are doomed to failure in building business cars.

Motor truck reorders are inevitable with large firms provided the trucks first purchased but still on trial from an operation viewpoint are well built and adapted to the work involved, and the sales department handles the matter of additional trucks intelligently and in a spirit of fairness to the buyer. But create the impression, by over enthusbastic order takers, that the purchasing agent must go to his superiors and ask them to let him practically scrap, at once, the rest of his horse and wagon equipment and you may have retarded sales indefinitely.

We have given much thought to this matter and have doubtless lost many sales by waiting until in our opinion a customer has had time to balance his ledger and show a profit from his first small installation, just as we have lost sules by declining to build special trucks which we knew would prove impracticable and eventually dissavisfy the customer. On the other hand we have in some cases made a lasting friend for our product by counselling the too ardent convert to ejectrics to go slow and to order tracks only as fast as he could economically use them to supplant other equipment.

All of which emphasizes a growing impression among some truck manufacturers who have been building trucks for 10 years or so that selling motor trucks is a science in itself and that the most brilliant pleasure car salesman may sell but a few trucks and these to his firm's sorrow.

This is why I believe that sound engineering principles and workmanship evolving a standardized product, combined with intelligent co-operative sales methods will produce the bulk of motor truck reorders in the future.

UNITED STATES TIRE DATA.

information relative to the tire problem is always of interest to the user of the commercial vehicle and prospective purchaser as well. An unusually attractive booklet has been issued by the United States Tire Company, New York City, and the brochure describes and illustrates in detail the new United States standard tire and demountable rim, which is manufactured for single or dual tread. This device permits of the removal and replacement of a shoe easily, thereby saving considerable time. Accompanying the booklet, which is printed in colors, is a card giving the standard tire and wheel dimensions for demonutable and non-demountable solid motor tires adopted by the Society of Automobile Engineers, also the general dimensions of the product of the United States Tire Company,

LA FRANCE GASOLINE-HYDRAULIC TRUCK.

Five-Ton Vehicle in Which the Clutch, Sliding Gears, Jackshaft and Differential Are Eliminated by the Use of the Manly Patent Transmission, Which Has Remarkable Flexibility and Greatly Multiplied Power.

THE use of a pump in which oil is the circulating medium, and the utilization of this pump by varying its capacity instead of changing the speed of the motor by which it is driven, this pump taking the place of the conventional gearset or transmission mechanism, is the feature of the La France gasoline-hydraulic truck. This machine is built by the American-La France Fire Engine Company, Elmira, N. Y., and the device is employed under a license for the patents granted to Charles M. Manly. The system is known as the Manly hydraulic transmission, which is an adaptation of the pump instead of gearing, the pump in turn driving oil through a construction termed motors, which are really actuated by the circulation of the oil, and these motors turning shafts on which are sprockets, from which chains transmit the power as with any normal form of side chain drive to wheels revolving on a dead rear axie.

of aide chain drive to wheels revolving on a dead rear axie.

It will be seen that the construction as it is in these trucks eliminates the usual form of clutch, change gearbox,

steam engine of good design will withstand an overload of from 50 to 200 per cent, for a limited period, and from the imaginary nothing to this extreme any power may be used. This power is dependent upon the engine speed. With the gasoline motor reasonable movement must be obtained to develop power and between the points where efficient energy is developed and where there is no possibility of damage, let us say from 800 to 1200 revolutions, for example, is the range of variation. This is as broad as good practise would dictate. It will serve for illustration, however. Between these points the engine may he varied, but to obtain an ideal it ought to be maintained at 1200 revolutions, we assume. Were this done we would have simply the three speed steps, which we will further assume to be one-third and two-thirds of the engine speed and direct drive. There would also be the reverse of one-sixth engine speed. To get wider power variance we accelerate or tessen engine speed, with consequent variation of power in a far different manner



The La France Five-Ton Truck in Which the Munty Hydrandic Transmission Takes the Piece of the Conventional Driving

the drive shaft, the jackshaft and the differential. The power delivered at the traction wheels is dependent upon of the power delivered at the pump of the derivative of the der and pision type, and this flow is varied by chaning the length of stroke in the pump cylinders from zero to the fulless capacity. With the usual form of power reduction by change of gear ratio there are distinct steps, ordinarily three in a forward movement, and but one for a hackward movement of the vehicle. It is true there is a considerable variation possible in the engine speed, but when running slowly the motor does not develop its normal power, and to race the motor mean deviceration. The hydraulic drive of the full power at whatever ratio may be fleressary to obtain the desired vehicle movement.

In consection with this form of power transmission it unight be said that it is in effect a parallel of steam in that there need be no gradations of increase or reduction. One of the greatest qualities of the steam engine is that the precise power needed for a work may be certed to the maximum capacity, the only effect of an overload with a steam engine being to stop it, just as gravily will overcome velocity when a cannon hall is projected into space. Any

than night be assumed. To apply the power slower we increase the lowerage tributhy against, and when used this leverage relieves the engine of a part of its load and it will increase its speed materially. With lessende vehicle speed the motor speed is generally increased and the motor will acquire speed as its load is diminished or the leverage is increased by sear reduction. But under any circumstances consider the property of the property o

Steam has enormous expansive force and great classicity. Fluids cannot be compressed and therefore have little clasticity, but it is possible by forcing them through orfices of varying proportions, as from a cylinder by a piston, to produce a cushioning effect that may be estimated with great exactness and to cause certain results. For instance, in the utilization of this principle the recoil of heavy naval guns has has been cuttively shorted and shocks of tremendous force very largely eliminated, or at least brought well within the limitations of the gun mounts. This has been accomplished by a system of cylinders filled with specified his which are plumers or pistons. In the pistons are series of channels or grooves that are tapered with the similest end hearest the muzzle of the cannos. As the similest end hearest the muzzle of the cannos.

the zed by Google

gun is fired the mount is driven backward and against the cushion of glycerine by the recoil. The fluid is forced into the grooves and flows toward the other end of the niston, but as the volume that will pass from the smallest ends of the grooves is dependent upon the force of the recoil. and as a greater quantity of glycerine will enter the largest ends in a given time than can flow through the smaller ends In the same period the impact of the explosion is sustained upon the glycerine. The fluid begins to pass through the grooves as the viston moves and as these constrict the velocity of the flow increases but the volume is no greater. The impact or shock is at maximum when the piston begins to move and as the piston moves backward its velocity decreases gradually until it stops. It is possible to compute with a certainty every factor entering into construction and operation of such a device

With the hydraulic transmission as constructed under the Manily patents the principle of the receil absorbing device in reversed. It may be defined as a system of pumps, motors and piping which is filled with oil. The pumps force the oil to circulate through the system and the rapidity of movement of the motors is dependent upon the veloctry of the circulation of oil. The motors must be of maxivelocity and the pumps to an exact number of revolutions each minute, the circulation of the oil may be theoretically from zero (and practically nothing) to a maximum volume,

it is well enough known that gases may be compressed to liquids, but not beyond that point. I'nder some conditions in the use of the motor wagon it may be necessary to stop quickly, in fact to stop the pumping of the oil circulation. This would mean stopping the motors and there would necessarily be increase of the pressure in them. This has been compensated by a valve that will open when the pressure of the oil has reached 2000 pounds to the square inch, and the oil will flow through this until the pressure falls below 2000 pounds. The normal pressure forcing the oil circulation is estimated to be 400 pounds. so that when this has been increased five times the safety valve releases the excess and there will be a slight movement of the motor corresponding to the difference in the pressure upon the oil, but the excess oil is thus passed from the regular circulating system around the motors to another point in the system between the motors and the nump, thus practically equalizing the pressure to 2000 pounds or less. It might be pointed out that while these pressures have

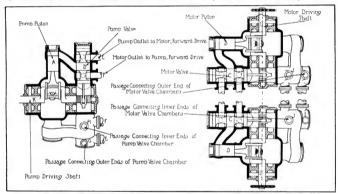


Fig. I.—Drawing Showing the Manner of installation of the Hydranite Transmission System, the Pump Transverse of the Change Frame and the Motors and Shaffa Serving as the Conventional Jackshaff to Drive the Rear Wheels by Double Side (Theles.

mum capacity and for that reason the power generated is absolutely dependent upon the speed at which they are driven. The slightest movement of the oil must have an effect upon the motors. The impulse may be made by the passing of a very small quantity of oil through the motor, and the shafts may turn but a single degree, but this impulse has a positive power value and a definite force.

As it is regarded as imperative that the vehicle engine should be driven at or as near a constant speed as it can be adjusted to develop a given power, and as the oil motors must have a stated capacity, the flow of the oil is not varied by the speed of the vehicle engine but by varying the capacity of the pumps. The pumps must have variable capacity, and as series of pumps would result in establishcapacity, and as a series of pumps would result in establishparts of the pumps. The pump is been fixed upon as giving a satisfactory result these may be changed to meet any requirement. They may be less or more or with differing relations, but in practical service these figures have been established as meeting such conditions as might arise.

Reference has been made to the increase of power by slowly applying it by gear reduction, and with the Manly system there is a similar increase possible through the exercise of greater pumping capacity, for the pumps can be driven to the safety valve limit of 2000 pounds and the oil forced through the motors at that pressure. As the pumpage through the system may be varied at any pressure the motors may be made to move very slowly and with extreme power. Estimating this power to be in direct ratio to the increase in pressure in the oil payient it may be two to the increase in pressure in the oil payient in may be ready valvel or five times. With the center of ming it affects valvel or five times. With the center of oil circulation from zero to 2000 pounds to the square inch, which affords a margin very much in excess of all probable requirements.

in fact there is so wide a range that it parallels the steam engine for variability, elasticity or flexibility, for any one of these terms will fairly well represent the quality.

In considering the possibilities with this form of drive or transmission it may be well to centrast it with the conditions to be met with in the service wagons generally in use. This is with reference to the construction and the result of continued operation. Any shaft driven vehicle must have power transmitted through worm or bevel gener. There is a degree of friction transmitting power at angles that cannot be overcome. Without specifically detailing this frictional loss of power, which must be apparent in the new machine, there is no question that it is must also increased as the mer theory, due to a perceptible degree to the Irregistar torque or movement of the esgine, and this may be followed through the clutch, the transmission, the shaft and universal joints and the differents

Theoretically a double side chain drive has the greatest efficiency so long as the chains are well cleaned and lubricated and the sprockets are not badly worn. But with the system that may have an initial efficiency of 96 (the max)mum of expectation), the loss may be as high as 33 per cent., approximately. Of this about 10 per cent. may be attributed to universal joints with shaft driven machines. The remainder is to be distributed through the sys-Contrasting the side chaln driven types there tem. is little probability that this loss will differ much with either form of transmission so far as the chains are concerned, but there will be a decided gain in the Manly drive because there is a minimum wear with a motor driven at constant speed, and there is the elimination of the clutch, the universal joint between the clutch and transmission, the transmission, the universal joint or joints of the driving shaft, and the differential gear of the jackshaft

As the Mahly system of pumps and motors operates In oil which at a pressure of 140 pounds must pehetrate to and between every surface in frictional contact it will be seen that there is but little wear probabile. Every moving part of the pumps and motors is constantly buthed in oil and the harder the work the greater the certainty of lubricity of the constant of the contact of the contact of the circumstances. There is in the Manly system eight gallons of oil in circulation in the pumps and motors.

The power required to move a load from a standstill is much greater than is required to draw or pull it. As is weil known. It is easier to draw a load than to push it. That is why practically every form of transport is drawn instead of pushed along. With the motor wagon the vehicle is pushed and to overcome its anchorage a much greater effort is necessary to start. This is the reason for applying power slowly and obtaining greater leverage when starting a truck or wagon, changing to a higher gear ratio and lesser power application when the movement has been begun. With the steam vehicle the power is exerted slowly, from the imaginary nothing. With the conventional transmission the start is made on the low gear ratio. With this form there is more or less strain upon the engine and the engine cannot be driven to its greatest efficiency when the delivery of power is most needed. When the truck is loaded it must subject the power plant to the greatest stresses in starting and in climbing grades where it is necessary to change to a lower speed. With the Maniy transmission the full power may be utilized at any time and under any circumstances, with the least strain upon the motor, While the La France truck has abundant engine power

of Is rated at 8.8. horsepower by the S. A. E. standard. It may not be recessary to utilize but a part of this, and there is a reserve that may be applied when desired. The power is generated by a conventional gasoline ford motor of the four-cylinder, four-cycle, vertical type. The critidors have a bore of 5.5 inches and stroke of asi, inches, are of the Arriob type and are east in pairs. The maximum speed is fixed at 120 revolutions a minute. This engine is carried under a hood between the seats for the driver and the helper and it is couled by a radiator at the front of the classis, the water being circulated by a goar driven pump, and drafts from the fam mounted on the forward cylinder.

and driven by a belt from the cambiant extension, and the from the fan-bade spokes of the flywheel. This statement from the fan-bade spokes of the flywheel. This statement has the fact that the truck has power state that is at least equal to other vehicles of its class, saided from the fact that it has the qualities specifically stated, and in other words, it is possible, it is possible and then beyond this to the limitant of the all motor switches makerly valve.

There is nothing in any way unconventional with the truck save in the transmission or driving system, which, while known to many engineers, is not generally familiar to those well versed in motor vehicle mechanies. For this reason a somewhat more detailed description is given, which is supplemented by three drawings, one of these being without reference to proportions and merely serving to litutative the manner of installation of the transmission. It

By reference to this sketch it will be understood that it assumes a mid-section of a chasis frame, showing the end of the driving shaft that is coupled with the engine crankshaft. This driving shaft is carried in an installation or mount and coupled to this is the device that controls the oil pump. Examination of the lilustration of the truck itself will show that this mechanism and the oil pump form practically one assembly that is carried between two cross members of the frame. The pump consists of a housing that shows the five yillnders in which the pump pistons

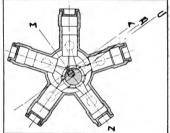


Fig. 2.—Transverse Section of Pump, Showing to Five Cylinders Located Around the Central Crank Chamber and Unistrating Method of Varying Struke of the Pump Pistons.

or plungers are arranged radially with reference to the driving or pump shaft, and that paralleling these cylinders are the five vaires or cylinders through which the oil is forced by the action of the platons. In the operation of the pump each piston is in turn actuated as the driving shaft is revolved and the stroke being variable the oil is forced through the valve and into the piping to the oil motors.

Further examination of the filustration of the truck will show that there is at either side of the truck a single oll motor assembly, which are operated in unison, as the oil is normally pumped to each motor in precisely the same volume and speed. As the oil is forced through the oil motors it is carried back to the pump and while the truck is moving there is always a circuistion of oil. It is possible, however, by circulating the oli from the pump around the motors to move the truck by turning the starting crank. or it may be pushed about the garage, for instance, by band. Each oil motor has its own independent driving shaft and in turning a corner the motor at the outside will move more freely than that at the inside because of the lessetted resistance, this condition being practically the same as might be found with a differential gear, though driven from the outside instead of the centre of a divided

The pump is a decidedly interesting mechanism and it is possible to fairly illustrate it by reference to Fig. 22000[C

which is a cross section of the pump cylinders and does not indicate the vaive system or the manner of oil circulation through the pump. it serves to demonstrate the method by which the length of stroke of the pump pistons is controlled. On the pump driving shaft is a bushing or sleeve and the connecting rods of the pump pistons are attached to this bushing. Referring to Ftg. 2 It will be seen that the line M-N passes through the centre of the pump driving shaft, the centre of the eccentric crank of the pump driving shaft and the centre of the eccentric pump driving shaft hushing as they are shown in sketch. The line A intersects the line M-N in the centre of the pump and the centre of the pump driving shaft. This is also the centre of rotation. The pump driving shaft has an eccentric crank whose centre is shown where the line B intersects the line M-N, and the eccentric pump driving shaft hushing bas a centre where the line C intersects the line M-N. The eccentricity of the hushing is equal to the eccentricity of the That is, the line B is equi-distant from the lines A and C. This eccentric bushing can, at the will of the operator, be rotated about the eccentric crank of the pump driving shaft independently of the rotation of the pump driving shaft Itself.

in the position shown the stroke of the pump is equal to the eccentricity of the pump crankshaft pius the eccentricity of the hushing, and is at maximum. If the bushing

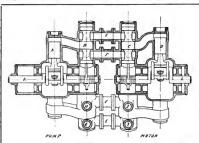


Fig. 3.—Sectional View of Pump and One Motor Connected by Piping to Illustrate the Circulation of the Oil in the Manny Hydraulic Tr. anamission,

were rotated about the crankshaft through the angle of 180 degrees the line C would coincide with the line A, the bushing and the pump driving shaft thus becoming eccentric, so that the pump would have no stroke at ail. The different positions between these two extremes give different strokes, and since any position of the huahing may be established, any stroke of the pump can be obtained, which, of course, means any speed for the pump, the motors and the truck. The rotation of the crankshaft bushing from the position of maximum stroke to no-stroke position is accomplished through the use of an auxiliary piston, lying parallel to the shaft, and supplied with power from the fluid pressure of the pump. The piston operates on the bushing through appropriate mechanism. It is under the control of a pilot valve which is actuated at will by a hand lever. Briefly the double-eccentric action makes possible the variable character of the pump stroke.

Referring again to the Illustration of the truck it will be noted that there are two plpes between the pump and the oil motor, and through one of these the oil flows to the motor and through the other is returned to the pump. When the pump is reversed, and it has a reverse capacity of a quarrer of its forward pumpase, the circulation is correspondine of the pump. When the pump is the pump is the pump is pretained to the pump is pump in the pump is the pump is the land of the pump is the pump is the pump is the pump is the land pump is the pump is For the further illustration of the system attention is directed to Fig. 3, which shows a pump at the left of the assembly and a motor at the right. These are not the positions they have in the installation in the truck, the vehicle illustration showing that the driving shaft of the pump is at right angles with those of the motors, the plying being or considerable length. This sketch atows, however, the cylconnecting them of both pump and motor and the plyes

Considering this drawing it will be seen that A represents the pump pistons and B the pump valves. Passages extend from the head ends of the pump cylinders to the centres of the corresponding vaive chambers through which the oil is forced by the pump strokes. C represents the valves and D the pistons of the oil motor, there being similar passages extending from the centres of the vaive chambers to the head ends of the motor cylinders. The passages are connected by the piping, which is shown by E and F. One pipe carries the oil from the pump in the one direction, and after the oil has passed through the motor it is returned in the opposite direction. The outer ends of the five valve chambers of the pump are connected by the circular passage G and the inner ends of the chambers by the circular passage li, and in a similar manner the outer and the inner ends of the five valve chambers of the motor are connected by the circular passages i and J. K represents

the driving shafts of the pump and the motor. The motors are identical with the pump save in variable stroke and size. This operation as illustrated is for the results or forward movement of the pump. For reversal the pump the stroke and then the valves change and the oil is simply pumped in the opposite direction through the ports and the plping of the motors,

When the motors are driven forward the pipe E supplies the motor with the oil forced by the pump, while the pipe F returns it to the pump from the motor, thus answering the purpose of an exhaust pipe. When the pump is reversed and the motor is driven backward. the pipe F becomes the supply pipe under pressure and the pipe E becomes the exhaust pipe, the direction of the circulation of oil through the connecting pipes becoming completely reversed. Should there be a sudden change in the speed of the vehicle or the pump quickly reversed the momentum of velocity in one direction is taken up by the transmission aystem. That is to say, the pump being idle the oil resists the movement of the motors to a pressure of 2000 pounds, when the bypass valve will be opened and the oil will then flow beyond

the motors, but not through them. Naturally this resistance to movement is as strong a brake as is the movement of the engine a source of energy. in this system no definite statement has been made as

to the maximum power that may be exerted by the vehicle engine. It is a perfectly established engineering law that by hydraulics any force can be multiplied any number of times, but the greater the resultant force the slower the movement. With the La France truck 6500 pounds has been determined as the maximum tractive effort that can be employed without undue stresses upon the vehicle itself. This was determined by a test in which two spring scales were attached to the rear end of the truck and to a stationary object. The truck engine was started very slowly and the pump action reduced. When each scale indicated 3250 pounds the pressure of oil was such that the hypass valve was opened and the fluid was circulated with the truck at a standatill. The valve had been set at 2000 pounds. This test having established a satisfactory margin the standard of pressure was adopted as 2000 pounds, for this cannot he exceeded by the operator and there can be no possible damage when this pressure is reached. The actual maximum is the bursting point of the piping and the pump and motors. The tractive effort always available is sufficient to carry the truck, weighing 8000 pounds, with a load of 12,- grade with snow hub-deep. It will be seen that this capacity is equal to any demand that might be expected, and far more than would be required in the conditions for haulage usually met with.

Now as to the efficiency, the makers will guarantee that this will be 87 per cent, of the useful power developed by the vehicle engine. A series of tests were conducted by George H. Barrus, an independent consulting mechanical expert, under four different conditions. These were as follows: Series A, with the circulating oil at medium temperatures, the driving shaft supplying constant power at constant speed, the driven shaft receiving constant power at varying aneed: series B. with the circulating oil at medium temperatures, the driving supplying varying power at constant speed, the driven shaft receiving varying power at varying speeds; series C. with the circulating oil at maximum temperatures. the driving shaft aupplying constant power at constant speed, the driven shaft receiving constant power at varying speeds; series D, with the circulating oil at maximum temperatures. the driving shaft supplying varying power at constant speed, the driven shaft receiving varying power at varying apeeds.

Series A tests at 363 revolutions a minute of the driven shaft gave 8.3, per cent. Gelicinery; 250 revolutions gave 8.9, tper cent., and 140 revolutions 5.7, per cent. Series 8.9, tper cent., and 140 revolutions 5.7, per cent. Series 161 tions gave 8.8, 2 per cent., 264 revolutions gave 9.1, per cent., 270 revolutions gave 9.1, per cent., 270 revolutions gave 9.9, per cent, and 163 revolutions 8.7, per cent., 264 revolutions gave 9.9, per cent, and 165 revolutions 8.1, cent. Series 0 tieses the 550 revolutions gave 9.9, per cent, and 165 revolutions 8.1, 6 revolutions 8.1,

There are many elements that make for economy entering into the use of this form of transmission. The constant speed motor is the most economical form that can be used, and with this type It is possible to use other and less expensive fuels, such as kerosene or even heavier hydrocarbons. Besides this it is possible to control such form of engine without spark adjustment and there need he no carburetor adjustment other than at the carburetor trail. This eliminates all control elements to the lever by which the transmission pump stroke is varied, which is located on the steering column. By the movement of this lever the truck may be handled to the fraction of an inch, a matter of extreme importance when space is limited. As a matter of fact a governor which will eliminate any other control is recommended by the builders. By merely turning the engine crank the transmission pump is transformed into a hydraulic jack of enormous power. This may be utilized if necessary to move the car. It is also possible to lock the two driving shafts of the motor so as to cause equal tractive effort with both rear wheels. The truck may be operated by the man who knows nothing about conventional forms of transmissions. Every complication so far as the driver is concerned is eliminated.

As a matter of fact the truck may be driven at all four wheels by this form of power if desired, and this power may be also utilized to atter the vehicle, and for hoisting dumping hodies, etc.

The other details of the truck are interesting because the construction is designed for especially heary work. While normally rated at five tons it is held that it will safely stand an overlead of another ton. The deck of the truck is I by six teet, giving 84 square feet of loading space. The by six teet, giving 84 square feet of loading space. The overall length of the truck is 18 feet 11 inches and the width seven feet 2.5 inches, with wheelhase of 183 inches and clearance of 12 inches. The vereal set 61 inches for word and 68 inches and the width seven feet 2.5 inches, with wheelhase of 183 inches and the feet three inches. The tread is 66 inches forward and 68 inches at the rear. The turning radius is 45 feet. The weight of the chassis is four tons, the maximum speed for-it the stands of the same of the sam

Some detail has been given concerning the vehicle motor

which has force feed inbrication to the bearings and spinsh for the engine interior. The kinition is by Bosch magneto, dual, with fixed spark. The radiator is of the cellular type. The gas is ordinarily controlled by a foot accelerator.

The chassis frame is of pressed alloy steel channel section 9.5 by three linches by 18.7.5 inches, not trissed, but is built with numerous cross members and heavy gusset plates. The springs are semi-elliptic, 122.3.5 inches forward and 483.3.5 inches rear. The rear axie is dead, three inches, thou the semi-elliptic inches rear than 1.5 inches rear. The rear axie is dead, three inches, thou the semi-elliptic inches are of wood, artilliery type, and the tires are the Kelly-Springfield sectional, 36 by the forward and 38 by nine rear. The radius rods are 2.5 inches in dismeter alloy steel. The emergency take is expanding on the rear wheel drums and is operated by a lever at the right side of the driver. The gashine tank ciparet is the probability of the control of the probability of the control of the probability of the capacity is 22 gallons and the oil capacity is 22 gallons and the oil capacity is 20 gallons and the oil capacity as

The principle of the transmission is not new, but its application is. The first device of this character used was installed in a two-ton wagon in January, 1907. This vehicle has been used for demonstration purposes and yet no changes or repairs have been made in the transmission during the period of service. It has been driven more than sweet miles with no load of less than two tons. The Bethlewick of the control of the co



Plant of the American-La France Fire Engine Company, Elmira A, A., Where the Hydraulic Track is Hulit.

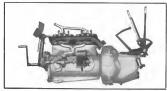
heing owned and controlled by the Manly Drive Company, New York City. The American-La Prance Pire Engine Company, which has been for more than 35 years one of the best known builders of fire apparatus in the country, is building these trucks under license. The light-rulk Truck Sales Company, New York City, has been organized and incorporated to market this production.

"TRUCKS RELIABLE," SAYS WILLYS.

"The commercial vehicle has reached the advanced development of the pleasure automobile," says John Willys, president of the Willys-Garford Sales Company, distributor for Garford commercial and pleasure vehicles, "notwithstanding the fact that some are of the impression that the husiness wagon has not progressed as rapidly as the lighter car. This is due, in a measure, to the fact that the former has not participated in as many spectacular contests. The early experiments of the power wagon were in the nature of private tests, but were, nevertheless, more exacting than those of the other type of machine. To prove that the commercial vehicle could withstond as gruelling a strain as the highest type of pleasure car, they have accompanied the latter in tours and endurance contests as baggage carriers, and in these runs performed consistently, maintaining the schedule of the other mochines. The business wagon of today is so reliable and rugged and trustworthy that it will carry its load anywhere. There is no question that the motor truck has arrived."

NEW HAZARD MOTOR CATALOGUE.

The new catalogue issued recently by the Hazard Motor Manufacturing Company, Rochester, N. Y., will appeal to



tall Power Plant Produced by the Hazard Motor Manufactur-

automobile engineers as well as show interested in the subject of power plants. It is not only a beautiful piece of printing, but the descriptive matter fully gives in detail to the construction of the Hazard motor. The book is unusually well illustrated, depicting as it does, different power plants for commercial vehicles, also the special reductions box on the rear end of and integral with transmission, a new feature for use on heavy cars utilizing shaft drive. This arrangement provides an additional reduction of 2.5 to one, although different ratios are made.

The accompanying cut, which is a reproduction, the first employed in the eatalogue, depicts the complete power plants which consists of a four-cylinder, four-cycle motor with three speeds forward and reverse selective type of transmission, in one unit, connected by a multiple disc clutch of 16 hardened, tempered and ground steel plates running in oil, operating clutch and brake pedal. All specifications of the product of the company are fully illustrated, making it of value as well as interest to the reader. Copies may be secured by addressing the company.

FACILITATES LOADING LUMBER.

To make motor trucks profitable in the lumber industry long waits must be avoided while the material is being assembled. Where the loads consist of various sizes of lumber considerable time is consumed in making up the order, During this period the power wagon must be kept busy hauling, and to allow this a movable platform is utilized which pernits of shifting the load from one vehicle to another, an operation which consumes but a few minutes.

in the accompanying illustration is shown the device employed by the Curris, & Pope Lamber Company of Boston which concern maintains a feet of Withic ears, made by the White Company, Cleveland, O. One of these is depicted beside the vehicle little with the platform and the positions occupied, if the latter were to be transferred to the automobile.

While the power waxon is delivering the other yielded is being loaded in the yards, being handed by horres. When the car returns it is operated into position beside the load-ed waxon and the load shifted. In order to vary long pieces of material the ratised frame of the device is fitted with rollers, the forward member being elevated which permanent the transportation of long beams, as well as making means their management mykes it possible to produce maximum results.

BILL TO LIMIT TRUCK WEIGHTS.

These connected with the motor track industry, as well as commercial website suchs, will be very nuclear the properties of the highways. While the full text of the proposed legislisation has not reached this office, it is understood that its provisions are such that it practically would probably the use of trucks of more than two toes capacity. There is little doubt that the public hearings on the bill will be attended by those who appreciate the value of understratements will place the law on the statute books.

IMPORTANCE OF SERVICE STATION

During an informal burcheon given by C. P. Coleman, president of the International Motor Company, New York City, in that city recently, at which were present heads of the various departments, arestin, etc. Mr. Coleman spoke of the Importance of the service station, its maintenance and the necessity of having competent trouble men and the most of the company of the company of the company of the company interesting features pertinent to the commercial which industry.



Lumber Loading Device I tilized by Boston Firm Which Perndts of Shifting Load to Truck Without Loss of Time.

PRACTICAL MOTOR TRUCK BODY DESIGNING.

Sizes Regarded as Capacity Standards, from Which Estimates Are Made and the Differing Constructions Created—How the Components Are Specified and the Materials

Are Selected and Prepared for the Assembling.

ity William W. Scott.

THE acceptance of certain types of animal vehicles as attandard, and then the manufacture, first of compodimensions that have been adopted generally. It is possible, for linetance, to purchase all the parts necessary for
practically any form of construction, even to fittings, hardware, and the like, so that a type of wagon or carr may be
built or assembled by a bundered different workers and
yes differ slightly, if at all. This rondition had the effect
of standardizing horse transcers and phis has led to the
assumption that we must accept as fundamental the dimensions of these conveyances. Sundardization is a manufacdimension of these conveyances. Sundardization is a manufaced as standard for one form of production may not be
satisfactory, or even autted, for another.

in the construction of motor propelled wagens there are many conditions arising which are so radically different from those obtaining with animal service that one ma-

stresses on account of the careless arrangement of the load. Just the proportions of the load and its location on the chassis must be problems for the designer to solve, and these must govern the form and size of the body and the weight that may be carried in it. it is obvious that chassis design differs widely. With some the construction is to bring as much as 33 per cent, of the freight weight upon the front axle, and this ratio may lessen until as much as 95 per cent, of the toad is carried upon the rear axic. With some the centre of the load may be very close to the rear axie and, with others, even behind it. it is understood, of course, that the distribution means when the chassis is level and the load properly placed. It may be assumed that overloading may be permitted, but while it is not impractical to vary slightly from the capacity limit it is apparent that when the load of a power wagon is not equally distributed there is considerable more stress on the construction, at least a different stress, and with the increase



Five-Tan Pierce-Arrow Worm-Driven Track Equipped with Steel Rody with Flare Boards for the Transportation of Coal—
This Installation Has Capacity for More Than the Normal Load, But Can Be Leed for the Hanlage of Other Materials.

express surprise that there has not been quite as great revolution in desirn as in power. In power, an observe association revolution in desirn as in power, in power was one chiral representation of effort have been followed and while those have been in practically every direction so far as merchanics are conserred, few have been hold enough to consider from a scientific viscopist time mixture of handless three that highways and open areas for shipping and receiving, buildings and the like, have created or arranged for horse service, but the original adaptation of power plants to existing wagons has led to accepting these wagons and carts as the funitations for moor transport.

It is also a fact that with the advance of mechanical engineering is applied to automotifies there has been little attention given to spring construction or design, and wille it is admitted that there is ferraler need of improved suspension and running gear there has been comparatively small progression. The increased speed, the treater stressand havier road shooks, have brought about heavier construction, but the win a certain need of load equalitation with reference to wheels, with need of minimizing the height of the centre of gravity of the load, and to loaner against in the height of the load these stresses are also multiplied.

Law Centre of travity Necessary.

For this reason it is desirable to bring the centre of gravity of the load as low as it can be with the design. While the tread of the vehicle may be 72 inches with some machines, with few exceptions it is necessary to earry the body above instead of between the wheels, and to insure wheel clearance when the springs are compressed the body must be sufficiently high. The condition is much different than is experienced with the animal vehicle where the land may be carried on heavy dead axles and entirely between the wheels, without spring suspension that is susceptible to overloading. Dverloading of the animal conveyance is senerally responsible for wrecks, but the attimals can and generally will stop when the work is beyond them. There is no indication of overloading with the truck nuless it is the sagging of the springs or the appearance of the tires and for this reason the limit is made for weight of freight. The manufacturer of the chass's protects himself by a goor antee, as does the maker of the tites, and it is expected that the conditions against overleading shall be lived up to Then It is essential that the owner of the velocic shall for his own protection regard the limitations placed upon the

Dig Load by Google

methic. It is obvious that were the construction such that 25 per cent of the load were carried on the forward axle and 75 per cent, on the rear axie, a change from these proportions to 35 and 65 respectively would be dangerous. As loads will vary so much in weight it is impossible to produce a general service body that may not at times be overloaded.

It is certain enough, however, that the classis builder has surrounded himself with all the safeguards that are consistent and it is further required by the majority of manufacturers that there shall be no change in the chassis. This means that while a chassis frame may be shortened, for instance, there can be no change in the mechanical construction, as to the relation of the axles, the transmission, etc. Should there be changes then the guarantee is violated and the owner destroys whatever protection he may have had had he preserved the changes acconstructed.

As the owner must conform to the requirements of the manufacturer and the sequeral design of the whole he has but one other recurse and that is the type of body that the tean install. While there may be needs that are urgent it is a fact that the body builder will know all the pitfalls and new will be able to make a construction that will conform to all engineering requirements and give the necessary faelilities. Sizes of Standard Body Trues.

In the hullding of motor vehicle hodies, both open and enclosed, there are certain sizes that are regarded as regu-

centre of gravity above the surface of the roadway.

How Gravity Centre of Londs Are Changed.

Taking a truck of five tons capacity as an example it will be understood that were the load of metal equally distributed on the deck or floor, centre of gravity would be low and the body space could be comparatively small. Were the load of stone the space would need be increased pro-As the load were varied and became more portionately. bulky it would be found that the body would necessarily be iarger and the centre of gravity raised. Taking cases of cloth or the like a load night be piled eight or 10 feet above the floor and instead of being pyramid form might be stacked so that on a comparatively slight angle there would be a heavy side stress that would be greater and more severe than would the effect of a freight of decidedly greater weight with centre of gravity carried low. A full load of metal might be equally distributed as to weight in orecisely the proportions intended by the designer, and yet the same weight of lumber might have stress entirely different. This being so it will be realized that while one or a few loads would not have material results, constant use under such conditions would eventually have destructive influences. The truck instanced, it will be recalled, was designed to carry live tons and for use with the load carried within estimated limitations. Obviously the floor area ought to be increased as the loads to be carried become hulkler to minimize the height of the centre of gravity of

the load, but it is apparent with the increase of body floor there is no variance of the chassis dimen-

slons It is a fact that wheelbase will increase materially with power wagon capacity, but the tread will not widen proportionately. The evident intention is to carry the load by increasing its proportions in length. The best Illustration of this is that chassis frame width will vary from 36 to 45 inches. this being the extreme from the lightest form of delivery to the heaviest truck, while the wheelbase will range from 80 to 164 inches The trend will increase from 56 to 72 inches with the wide forms of dual tires. the conventional forms of bodies the width will vary from 46 inches for the enclosed delivery to 78 inches for the open truck equipment, but it is evident that the load of the smallest may be 500 pounds and of the largest perhaps 15,000 pounds, this being



Reliance Three-Ton Track Chassis with Patent Steel Body Rolsted in Full Dumping Position, Showing Bulster on Which the Institution is Carried,

lar, these, perhaps, being accepted because of animal vehicle proportions. These dimensions relate to floor area or space and are, of course, subject to variation:

Weight of toad, ibs.	Size in Inches	Area, Sq. Ft.		
1,000	96%54	36		
2,000	108x56	4.2		
4,01111)	126x6#	52.50		
6,000	141x72	7.2		
5,000	156×72	7.8		
10,000	072×76	90 73		

It will be seen that there is necessarily a considerable increase in depth as compared with floor area to give the varying capacities. For illustration, there is an increase of 16.66 per cent of floor in the 2000-pound body as compared with the 1000, and 100 per cent. increase of floor in the 6000-pound body as tompared with the smallest. Yet there is a considerable excess capacity of the 1000-pound body which, with a depth of 12 linches, would have space for not quite a ton of bituminous coal, or practically 100 per cent. overload. And coal is by no means the heavier form of load that may be hasted. It will be noted as well cent. more than the 2000-pound body. This indicates that the capacity is obtained by increasing the height or depth of the body, and consequently the height of the load and the load on the load of the load, and consequently the height of the load and the load and consequently the height of the load and the

an increase of 69.5 per cent, in width and 2000 per cent, in capacity.

The body may be a plain platform with stakes and chain

The body may be a plain platform with stakes and chain for the haulage of packages, cases, harries, etc., or it may be with a body 12 feet in length, 66 inches wide forward and 7.8 inches wide at the rear, 30 inches deep and with fiare boards that will increase the height to 40 inches, giving a carrying capacity of eight toon when the load is of coal and heaped. When bodies are built for carrying furniture they may be 174 inches in eight had 26 inches in width, which was the state of the state

It may be said that requirements as met with in bodies are sometimes very widely varied and that larger bodies have been installed on 4000-pound wagons than on 10,000-pound chassis, this because of the load being light and bulky.

Though the argument may not be acceptable to those who desire to economize (from their own viewpoint) it is undouhtedly a fact that in choice of a body it is far better to consider the uses and select that which will afford the advantages and avoid the disadvantages. It is not judiclous to assume that what can be packed on a body should be a reasonable load. Body space is not a measure by which to determine rapacity and skyeraping loads are to to, be

discouraged without reference to the class of vehicle. Problems for the Designer to Solve,

These problems are for the designer and he must be guided by the chassis dimensions and the uses to which it will be devoted. This being so then it is essential that the chassis be examined, studied and analyzed, the proportions of the load to be carried on each wheel and each axle learned, the dimensions of the chassis frame noted, the requirements of the owner ascertained and the weight

adapted to load limitations. But it is imperative that every detail of the chassis be known, even to the location of a rivet or bolt head. Once a body has been built for a specific chassis the work may be repeated with this model as often as desired, but the slightest change must be of record. One of the most confusing conditions is the change In chassis detail from time to time by the manufacturers, which necessitates constant revision of record,

State See

Assuming that a chassis has been selected for a work

and the purchaser has consulted the body builder, it is desirable, but not necessary, that the chassis be delivered to the maker. If the chassis is not received, a blue print must be sent to the builder. this giving a plan view and a side elevation. With the chassis the special blacksmith work may be fitted, but with the blue print this work may be constructed to apecification.

Sketches and Working Drawings, First the side elevation of the body is drawn to scale and then a half, cross or end section is laid down, although often a full section is prepared. Sometimes the drawings are of the side, with the half front and the half rear elevations together with a half hottom view. The chassis is shown in dotted and the plan in solid lines. Occasionally the entire vehicle is shown in the plan. In the plan every piece of material is indicated and to proportion and note

is made of the number and the dimensions of each member. If the vehicle is covered frequently a half top or whole top, or a whole or half bottom view is given. The plan will show the location of each screw, rivet, bolt, brace, band, mortise, tenon, strip, post, panel, pillar, sill, bolster, stringer, molding, board or other component. It will show the exact size of each according to scale, and the relation of the one to the other so far as these should appear in the



Three-Ton Aleo Truck Equipped with Patent Steel Dumping flods with Monahan Patent Holat, Designed for Loui, Contracting Material and Lumber,

and the hulk of the proposed capacity load determined. With this data the size of the body necessary is arrived at and its position with reference to the chassis is established. Thus far no chassis have been built suited to carrying loads that are extremely long, such as lumber, metal rod, poles, and other commodities, for which special horse equipment is necessary. This means that to place a load of lumber 20

to 24 feet in length on a chassis with a body 12 feet in length, with overhang of four feet back of the rear axle, would carry practically all the weight on the rear construction, an exceedingly dangerous condition. Thus lumber 15 feet or less is the longest that should be carried in such a hody Neither is it practical to have the load extend greatly beyoud the side members of the chassis, 16.5 inches being the greatest allowance for such extension by the most careful designers, and then only with bodies that would not have a load more than 36 inches above the truck floor. These are examples of the limitations to be found with chassis of regular models. It is probable that instances of this character may be cited with reference to practically every type of machine.

The body designer takes nothing for granted. He is exceedingand record. He must be as precise as an engineer or an architect, and he must have ability

to produce whatever may be desired in ornamentation and to combine dignity and utility at least pleasingly. Body construction for mojor vehicles has as a basis

skill in drafting, knowledge of materials, and precise note of the designer's requirements as to the chassis. It is thoroughly practicable for the experienced man to take a blue print of a chassis and to produce a body that will not only be exact as to installation, but will be in every way



ly careful to have accurate note and record. He must be as proclea livery of tassolve, Labricating till and Kerosene.

side, end, roof or bottom elevation. In the making of the drawing, which is the complete assembly, there must be exact knowledge of the dimensions and proportions of each part. When these facts are noted it is possible for the designer to take them and make up the total from which the drawing is prepared. In other words the drawing is not possible until after every necessary fact has been estab-Habod

The first work is a sketch and from this the estimate 2000 C

are made and then comes the preparation of the specifications. In body building of recent years metal has been ntilized to some extent for work that must endure, and this



Fig. 1-Homas Front Platform Track Bods.

practise is extending, especially where the loads to be carried are heavy and the handling of the packages will quickly wear the wood. Metal sheathing has given way to heavier metallic construction because every element of strength may be had through the use of angles and tees and there is no possibility of deterioration from expansion and contraction of the wood through exposure to the elements in the course of the daily work. Not only this, the cost of wood has become almost as great as ordinary metals and it is procured with the greatest difficulty. This comment is interpolated to emphasize that knowledge of the value of metal in body construction is as necessary as of woods.

Preparation of Specifications, In any sketch or draft that is made the body is usually drawn in connection with the chassis to illustrate appear-

ance. This also makes it certain that the proportions are correct. To illustrate, the specifications for a working draft of a motor ambulance and casket wagon require the following parts:

Bottom Frame of Body-

	neriem trame or nee					
		Timber	Thickness,	Whith,	fa-t	
			10s.			311
	Side sills front:		1.87	33		3
			1.87	1.25		
	toside cross bars	. 4 904 80	1 27	1 25	3	3
*	Bottom boards.	1 100 16	63	- 1		- 1
	Pitters and Posts.	. 4 919 94	49.7	9		
	Coupe pillars.	2 4	5.6		5	
- 1	Side duor pillars	3 -1	1.75		i i	- 1
	Hinge door pillars	3 14	1.75		5	4
	Inside posts			97	5	6
111	Rear end cureer po	w.f.w.	~ *	17.	3	
			1.67	5.67	5	- 6
	Rear door pillars	- Audi	1.75		5	1
	Balls, Cross Bars and	Carren				
			1.37	3.5	11	2
	Top rails	A sele	1.37	2.5	- 3	11
- 1	Hear cross top rall.	Ash	1.57		- 1	- 1
i	Side ralls	Ash	1.62	5 .13	5	11
i	Door rolls	Ash	57	2 25	2	
- 4	Pence dust rails	Azlı	1.13	4		
- 1	Buttom door ralls	Ash	1.57	3	- 2	
	from strainers, curved		500	1.73	- 2	- 2
	Pompe pillar cross					
	tail	Azh	1.75	74	4	- 4
1	Coupe pillor fence cr	reese				
	rati	Ash	1.13	4	1	1
1	Front centre piller	Aich	1.75		5	- 3
- 1	Windshield curve.	Asti	1.13	2.5	- 1	1
12	Other top curves	A < h	57	3.7	1	5
	l'nnels					
	Bottom side panels			2.2	0.0	
2	Rell roll panels	.Popdn	.37	6	05	
- 4	Upper panels.	1*opta:	17.	1.5	6	
- 1	Helt rail door panels	Popts	1.3.2	G	2	
- 0	Lauwer door panels	Poplar	.3.2	-0 10 de de	2	
1	Top panels.	. Propile:	.3.2	1.1	12	
	Glass frame stuff	Ash	265	1.87	54	
	Glass frame stuff Body muldings 18th middings	(Aspin)	47	12	7.0	
	terly middings	Ash	7.5	1.6	3.5	

Many Parts in a Standard Body.

It will be noted from count of the components that 90 are specified besides the stock for the glass frames and the body and drip moldings, and this is simply the woodwork The body is composed of the frame and the panels (with the top when this is completely enclosed; the front, the rear gate or doors, the windows, ventilators, and so on, and each part must be created by the designer fust as is any other work to exact measurement. Not only this, the dimensions of each tenon, each mortise, each tap, each splice, each socket, each radius is specified and each design for decoration is drawn. If metal is used the formation of the joints and the reinforcements must be drafted and provision made for these in the wood that is to be shaped and firted about them, should this be necessary.

In this connection it may be noted that sheet metal has been used for many years for panels, particularly for service vehicles, and it has only been since the advent of the motor conveyance that aluminum has been utilized for panelling, it being susceptible of high finish and free from strinkage or expansion from varying degrees of moisture-Sheet steel and sheet iron have been utilized wherever the wear has been excessive and there is today a disposition to use these materials to a greater extent than ever before.

With the preparation of the specifications it is necessary to designate every bolt, rivet, screw, or other fastening, and the number and proportion of each. In addition there is also description of all hardware of standard manufacture or of special type, and besides this each band, brace, bracket, red, truss, clamp, clip, or other metal part that must be forged by the blacksmith is set forth in detail. Where it is necessary to build a bolster or under frame to install on the chassis to carry the body the components are similarly specified.

All Details Uberked and Described.

The details when classified and systematically enumerated are checked through and then the main plan is drawn, Then the body is described and with this description is a series of working instructions relative to each particular assembly or group. These relate to the woodwork only.

Then in turn is a specification for the trimming department which relates to the upholstery, if this be made up in connection with the body work, and similarly a specification relative to the painting, with a sketch or sketches and whatever special design may be desired for the decoration of the Where carving or stamped metal is used the facts are similarly set forth.

The working drawings are made and frequently blue prints prepared and with these the specifications are sent to the foreman of the woodworking department. He usually selects the stock from the rough lumber and this is taken and shaped to the form desired. Selecting the stock is work for an expert, and when it has been picked out with reference to securing parts of the required quality with the least waste it is left with the wood workers. Meantime the specifications for the blacksmith shop have been sent to that department and finally when all parts have been made ready the workmen assemble the body, each part fitting perfeetly.

The trimming is then begun and the work is made up in readiness for Installation when the painting has sufficiently advanced, these two works being carried on together until the finishing is completed. Naturally there is an extreme range in these details according to the service for which the vehicle is intended. While it is possible to estimate with accuracy the stock that is required for the wood and metal work, as well as the trimming, the finishing is more or less variable and may be inexpensive or costly,

Small Body on Heavy Chassis, Reference has been made to the necessity of the design-



Fig. 2-Roman Front Truck Body with Side Panels and End tinte.

er considering the construction of the chassis on which the body is to be installed and that the character of the body ought to be with regard to the service, and to bear

out this statement it may be noted that in one instance where a truck was to be used by a steel company for the transportation of metal the builder installed a platform of the size that would have ordinarily been used on a 6000pound chassis on a chassis rated at 13,000 pounds. The reason for this was that with the larger construction the truck might have been overloaded, and in any event with that type of deck the load might have been carelessly put on. With the narrower and smaller platform there was less probability of such abuse. There was little reason to fear the unequal distribution of the load with relation to the length of the smaller body, although this might have been a frequent happening with the regular size. Besides, there is a tendency of the load to work backward in a wagon when it is not properly packed.

There is another factor in load distribution that is exceedingly potent-the wear of the tires. This is a matter of decided importance with the careful body designer. While he cannot materially change the weight distribution upon the shoes he can so create the body that with proper loading the load will bear on the tires approximately as intended by the designer of the chassis, which will afford the targest margin of safety for the components of the machine, a condition that decidedly influences upkeep and maintenance. Hodies that are intended for one service may be built to carry a certain load and aiways under definite conditions when it is maximum. For instance, most of the bodies for brewery wagons and trucks are intended to carry 21 barrels in three rows of seven, but when these have been partly unloaded it is desirable to shift about those remaining so that great weight is not carried on one side.

How a Designer Estimated Capacity.

As an illustration of the possibilities in this direction a manufacturer who was about to purchase a truck sent for a body builder and asked his advice as to the chassis he should buy, saying that he wanted the truck to do certain work between his works and a railroad terminal. He shipped his goods in varying cases and received shipments In others of differing sizes. The designer went to the works, measured all cases that might be similar to those making up loads, and on the basis of these and the chassis capacity he outlined a body in which the cases could be packed which approximated the designs of several chassis With this information the manufacturer made his choice and the body was constructed at the designer's works. is needless to say that it has been a very satisfactory hestallation.

It might be possible to make numerous illustrations of a similar character in which the value of the special body is worth much more than might be believed. This is especially true of the springs of the truck which are usually much abused when the load is excessive. The springs will eventually weaken under a normal load by continued use, and where there is overloading there is always hastening of the day when the springs must be replaced. Not only this, there is the possibility of breakage because all the force of Impact with any road obstruction must be sustained by the springs besides carrying the load. With the breakage of springs a truck must of necessity be withdrawn from service and there is the additional cost of the replacement, two unnecessary causes of loss.

Excess Stresses from Overloading-

Another danger from overloading through the poor design is when the load is so placed that a considerable excess of weight is carried on one side. This will result in a much larger proportion of the load stress being sustained by a single rear wheel, and when not on a level and when turning corners, with the tractive effort and the turning strain, the wheel is subjected to forces that cannot be long withstood. With this condition to be met with in constant service there is the best of reason wby the capacity of the truck should not be exceeded

In the development of the truck body the statement has been made that it is possible that the body builder has created designs that may be, with reasonable modification, adapted to many uses, and having these designs it is possible for him to produce individual orders at prices that are in every way reasonable. That a single design may be made in differing sizes for varying loads, and from different materials, has been stated, and in connection with this it is well to point to some examples of possibilities in this direction

Platform Truck Body and Modifications.

Probably the simplest form of truck body is that known as the piatform, which requires the installation of a deck on a chassis on which many kinds of loads may be carried. It is possible by the use of stakes or side boards to convert this body to other uses, and being open it may be utilized for numerous purposes. The basis of practically all truck capacities is floor area, a tabulation of standard Reverting to sizes being previously given In this article. this, and regarding as a truck a vehicle with carrying capacity of 6000 pounds, it will be seen that there is a variance of but four inches in deck width and 28 inches in length. This gives 18,75 square feet additional carrying space, or about 26.04 per cent, more with the larger vehicle, while the capacity increase is 60 per cent. Taking a load of the same commodity it would be necessary to plie the load higher on the larger body, and no matter how this is done the centre of gravity is necessarily higher and there must be a greater strength of construction than would apparently be justified by mere increase of load.

Taking the platform body for transporting heavy material this affords every need, but stakes are usually provided for the purpose of securing the load. These may be of any convenient length. A typical type of this design is illustrated at Fig. 1, this being known as a Roman front platform from the curved front, which is assumed to resemble the Roman charlot. This platform will not have quite the area of the square, but the reduction is slight.

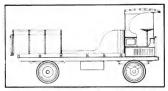


Fig. 3-Roman Front Steel Truck Body with Flare Boards sides and End tinte.

The front is of heavy sheet steel and serves to retain the load when packed. Stake sockets are bolted to the sills and with these a rope or chain can be made to form a light but effectual rail. The value of such a body is that It may be unloaded from either side or the rear and packages wider than the platform may be carried if the load should be bulky. This hody is regularly built in 4000, 6000, 8000 and 10,000-nound sizes.

Taking this same design of platform body it is converted into a brewery wagon or truck by the installation of the sides as illustrated at Fig. 2, this being known as a Roman front body with side panels and end gate. This form is primarily designed to carry barrels at the forward section and kegs at the rear piled between the side panels. In this manner a full load may be well balanced by the pyramid form of the kegs, these being pisced on the sides. The dash is extended back slightly and serves to retain the barrels, with abundant space for handling them, while rolls on the sides of the silis convenience loading and unloading. The side panels are secured to frames and well braced by extensions of cross members at the ends of the frames and by iron braces from the tops of the panels to the extensions. This body has the capacities stated for Fig 1.

Still another illustration of the use of this type body is shown at Fig. 3, which is designated as a Roman front steel with side panels and end gate, with flare boards on the side panels. This body is intended for the same general use as is that at Fig. 2, but it is somewhat differently proportioned as to sides and front, these being higher and permitting a larger load. The platform frame of this body is of wood

AMASONIA ()

HO WINE

to the same capacities as are the others.

and on this is carried the steel body, a construction that is especially enduring and which ought to be serviceable for a long period. The body is differently constructed than are the others and it is, of course, more expensive, but it has a similarity in design that is nanyeare. This body is built.

it is probable that no better examples of hodies might be pointed out for those who desire to give some attention to design and construction. Taking the plain platform, for Instance, it is but slightly modified as compared with the deck baying squared ends, and with the foundation of the deck it is possible to devise a very large number of bodies each of which presents features differing generally, if not wholly, above the platform.

(To Be Continued)

BALDWIN SECTIONAL STEEL TRUCK TIRE.

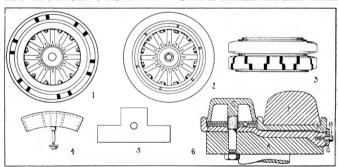
LF. N. BALDWIN, Providence, R. I., who is noted as a terracing driver, and is one of the best known motorists in America, bas invented a sectional steel tire which he claims possesses qualities that particularly adapt it to heavy which esercise and which, he maintains, can be adapted to any rim now in use. This tire is designed to be used in combination with solid shows of the present types, Mr. Baldwin claiming protoner the High of the rubber tire used with his device.

protong the life of the rubber tire used with his device.

The tire is unique in that it may be adapted to conform
to the reduction in size of the rubber shoe through wear and
that the diameter of the wheel as a whole may be varied as
desired. This is accomplished by using metal liners or

load largely carried by the steel tire he claims economy in that there is a reduction of the rubber surface a half, while the combination insures traction under all conditions of service.

The thre blocks may be made of any metal desired, but manganess tered is a probable material because it may be cast and it has unusually enduring qualities. As will be noted at Fig. 2 and Fig. 4 the blocks are formed so that when installed there is a space between the ends, which is to provide for the reduction of the external diameter of the tire. This space will vary from an inch to an inch and a water where the blocks contact with the ground. Reference



The Baldwin Combingting Steel Block and Rubber Tire for Service Wagons.

shims between the block and the rim. By these the external diameter of the tire may be increased or lessened, a process that requires but little time.

As may be known, rubber and rubber compositions cannot be compressed, but can be distorted. Under the pressure of loads and driving atress any solid tire will change its form and the tendency is for the material to be forced from the actual place of contact of the tire and the ground or paytic many the present of the drive wars the resiliency from the classicity of the rubber compound is lessened because there is a reduction of material.

Because of the rear wheels carrying the greater part of the load as well as transmitting the power the tires weramore rapidly than the forward sloes, for which reason dual tires were adopted. Mr. Baldwin elains for his invention that the steel sloee carries the load and resists the wear, and the rubber since affords the traction necessary. He bolds that on ordinary impaved roads there is no need of carrying the load on rubber alone and that on paxing traction is a condition nore required than a cushioning effect or the refrace slightly lower than the nermal face of the rubber sloee so that under compression the rubber and steel surfaces will contact with the road surface. With the weight of the to Fig. 6 shows a cross section of a block, which is cored to secure lightness. The blocks are secured to the rim and felior by boits cast integral with them. The blocks are so located that the boits are about midway between each spoke. They are secured by nuts and lock washers or other device.

The method of Installation is to fit a special rim to the wheel, the form of which is illustrated at Fig. 6, and this is shaped with a flange at the Inside. Against this flange the silins are placed, and on these shims the block, the same bott that retains the block retaining the shims. The channel section carrying the rubber tire is installed as is any solid wheel shoe, one flange of the channel bolding the block rigid against the wheel rim flange. When a new installation is made the surface of the rubber tire is about an eighth inch above the steel blocks, or quarter line hore the steel flocks, or quarter line hore the steel flocks, or a quarter line of any thickness that practice will dictate, so that the diameter of the steel tire is unformly reduced must a point is reached where the

With the rims now the vogue the blocks may be instailed by drilling the rim and fellor for the retaining bolts and the block may be retained against the rim flange of the.

rim by the channel of the rubber shoe. The wheel felloe and rim may be made any thickness and width that is desirable and the width of the steel tire whatever proportion is necessary to yield the best service. The rubber shoe is mounted on the outside of the rlm to facilitate case in installation or removal. It is not believed there will be occasion to remove the blocks unless for the reduction of dlameter by the thickness of a shim as necessitated by the wear of the rubber shoe. The construction has the merit of cheapness and endurance and it is held by the inventor that the tires, when used wherever dual shoes are installed will yield equal results so far as riding qualities are concerned, will give far greater mileage for the rubber tires, thus lessening the expense from one point of view, while the metal castings, after the first equipment, will be useful for a considerable period-perhaps several years.

The descriptions of the detail drawing are: Fig. 1, side-elevation of wheel, showing side of sectional blocks retained by folis through the felice. Fig. 2, reverse elevation of wheel, showing rubber show retained by flange and botts or cap serews. Fig. 3, plan or top view of the assembly, showing blocks and spaces. Fig. 4, side view of steel the block, the dotted lines indicating the core. Fig. 5, plan view of

REPORTS GOOD TRADE PROSPECTS.

According to George L. Sullivan, Alco sales representative of the American Locomotive Company, New York City, who returned recently from a trip extending over a period of two months, the prospects are excellent for large sales in the spring. He states that all over the country visited by him heads of business concerns are investigating the possibilities of the commercial vehicle and many have decided to replace the horse draw equipment with the mo-

In one city of 22,000 persons, Mr. Sullhan reported that eight cars would be sold, the of these to be bought by one home, a big department sore with branches covering considerable territory. These machines will be ordered before. February. A meat packing concern in the same vity is to place a var in operation to had its product from a town 36 miles away, and expects to double its present facilities.

In another western city a moving and transfer concern which makes long distance hards to nearby towns, will



Ambulance flody breigned and Fifted to 50 Horsepower Chassis. By the Missel Motor Car Company, Unrited, Wis, for Cook tounty Hospital,

steel shims. Fig. 6, cross section of tire assembly with these companents: A, souden where fetner; B, steel tire or wheel rim; C, cored steel block and retaining bolt; D, shims between steel block and wheel rim; E, demountable channel carrying rubber shoe; F, rubber tire; G, retaining flause or ring; II, retaining holt or acress.

HOLD THREE-DAY CONVENTION.

The first annual convention of the accepts of the Speedwell Motor Car Company, Isyston, D., was held recently in that city and the event occupied three days during which time the visitors were reveill emerationed by the company. During the daily sessions the visit ray were addressed by included adversiting, accounting, service, engineering, care and operation. Harry Croumser, who is in charge of the commercial department of the commany, and who has a wide experience in track work, addressed the convention upon the cooperation between the functive, agent and owner, Imparting much valuable information. Matters procent included agents from all sections of the country.

Hospini, add automoldles to take care of this end of the business

and additional distribution of the control of the business. Another concern is figuring on 10 cars to be fitted with special bulles to connect with street car lines.

A plan whereby five locations houses, all of different types, could be utilized on a commontly bases, fins been worked out by a truck dealer in one city, and it is proposed to purchase six machines and operator Pees points, thus effecting a considerable saving in the initial cost and maintenance.

REPEAT ON LAUTH-IUERGENS.

One of the best evidences that a motor vehicle is giving good service to held to be the fact that concerns give the maker repeat orders. This being true, it would seem that the Katz Mattrees Company, Uhleaco, has been decidedly satisfied with its first Lauth-Juczycza truek, made by the Lauth-Juczycza Motor Car Company, Premont, O. The latcies, it being the third repeat order seen in by the mattrees company.

The Red by Google

KNOX TRUCKS REPLACE HORSES.

Worcester business men were afforded an opportunity to note the progress of the commercial vehicle recently when the Worcester Brewing Company, W. H. Blodgett Fruit & Produce Company, the W. N. Gleason Company and the American Mail Order Company, discarded the old time railroad delivery of goods which necessitated packing and hauling to the freight depots. In place of horse drawn equipment motor trucks have been installed and, whereas it formerly required two days to deliver goods to Leominster and Clinton, it now takes but two hours. A Knox three-ton truck, made by the Knox Automobile Company, Springfield, Mass., in service with one of these companies left Worcester one day at 11 in the morning and arrived at Clinton at 1:45 in the afternoon, unloaded at several places, and was back in Worcester ready for other deliveries a few hours later. Knox cars are utilized by all the firms mentioned.

ADDS FIVE COMMERS TO FLEET.

Last winter the firm of H. L. Herhert & Co., New York City, a large coal dealer, experimented with a 6.5-ton Commer truck, which was placed in service by Wyrkoff, Church & Partridge, Inc. An earlier test of motor propelled vehicles by the concern is said to have been unsatisfactory, but the improvement in the automobile and success of other coal

hereafter as the Everitt, instead of the Hewitt, as formerly.

in speaking of the matter W. E. Metager said recently: "We have by no mean discontinued the manufacture of commercial vehicles. Lark of facilities in the past has prevented our giving much attention to this branch of the business, and rather than divide our energy, we decided to dispuse of a portion to E. R. Hewitt a new company, retaining the right to built the one-ton size. We shall continue to make this ear in beford without interring with our use to manufacture in quantity. Operations have afreedy begun and the new models will be marketed early in the spring. Their distribution will be effected by over 400 deal-ers handling the Evertiti line.

SHIPPING GAS TANKS ARROAD

According to the Prest-D-Lite Company, Indianapolis, Indi, when automobiles are exported it is necessary to certify on the steamship bill of lading that fuel, water and gas tanks are empty. Unless this is done the companies will refuse to accept the shipment even if the car be crated and boxed. The indianapolis company suggests that to prevent the ancrating of the machines and emptying the tanks, an empty member be utilized and that a conspicuous



Hercent Addition to the Flert of Commer Trocks in Service with B. L. Herbert & Co., New York 17(y-This Concern Hought 10st First Truck in April and Now Maintains Eight Machines.

companies led it to try the Commer truck, and for 12 days during the cold weather this car was subjected to strenuous work.

During the time the cost of operation and work performed was noted and it was found that 572 tons were hauled at a cost of less than six cents a ton mile. This led the company to order a similar machine, which was placed in service in April. A trifle over four months later a second automobile was purchased, and with the contract was a letter which stated that the first vehicle had lived up fully to the record made in the demonstration.

In November a third car was secured and the company promulgated a plan to replace its horse drawn equipment with the motor propelled vehicle, giving an order for five more, making a total of eight in service. In the accompanying Illustration is shown three of the ears fitted with special coal dumping bodies, the photograph being taken at the yards of H. L. Herbert & Co.

METZGER TO BUILD ONE-TON TRUCK.

The Metzger Motor Car Company, Detroit, announces at although it has resold to the Hewlit Motor Company of New York City, a large share of the truck business formerly conducted by the concern, it will continue to manufacture in Detroit, the one-ton model, which will be known

w Maintains Eight Machines.
Inhel be employed to denote this condition. A list of the

label be employed to denote this condition. A list of the countries where tanks may be exchanged for full ones is published by the company and may be obtained upon application.

CONTEMPLATE MOTOR 'BUS LINE.

Business men in Fort Bodge, Ia., are contemplating the organization of a company to finance and operate a motor bus line in that place. The scheme calls for at least four machines and these will be operated on regular runs, reaching all parts of the city.

MAIS EXHIBIT AT NEW YORK CITY.

During the automobile shows in New York City recently the Nais Motor Truck Company, indianapolis, ind., exhibited two models in the National Boat salesroom, opposite Madison avenue entrance to Madison Square Garden. The display attracted considerable attention, being so located that pairmon of the show could find it easily. President and General Manager Will H. Brown and C. H. Wallerich were interested to the case with the internal general control of the case with the internal general case.



Robert McAllister Lloyd, vice president and general manager of the General Vehicle Company, Long Island City, N. Y., in discussing the transportation problem recently, brought out some pertinent facts regarding the standardization of the electric vehicle, a step which he advocates and one which he states would be a great benefit both to the naufacturer and purchaser.

"It has been fully demonstrated by the results obtained during the past 10 years that self-proposelled road vehicles may be used economically and advantaseously to displace the lorse drawn equipment, also to compete with railroads in certain classes of transportation," says Mr. Lloyst. "libt voing to the many systems utilized in the application of power and great variety of designs, the buyer and meer of the electric whiche is likely to after much inconvenience from the darket of the working parts and some of the analitary apparatus.

"There is strong evidence that both the electric and gasoline muchine will be used in large numbers and auto-

mobile engineers and makers are beginning to study the possibility of making interchangeable some of the features common to both lynes of cars. The principal item. to suffer from use on all vehicles is the tire, and a consideration of this problem has resulted in the recent adoption to most manufacturers of standard wheel and tire dimensions, which make it mostilife to interchange various makes of tires on any standard rim. There are many other items common to both the gasoline and electrie which are being stundardized but these are mostly minor de-

"A standard voltage she till be agreed et and lattery coupariments of standard dimensions abouted be adopted. This world enable the operator of a vehicle to borrow or rest a hattery in an emergency and would permit the owner to take advantage of improvements in hatteries coming on present there is no standard as to the number of cells constituting a battery and therefore the charging battery and therefore the charging

equipment needed for one wagon may be different from that required by another. The voltage of electricity throughout the country is so nearly sufform that it would not be difficult to agree on a standard isstery voltage and so make possible the standardization of charging switchboards with their instruments, rheostate, etc., as well as the instruments utilized on the vehicles.

"The majority of electric commercial vehicles use a 44-eed battery having on discharge about 85 voits. The motors on these cars are rated at \$5 voits and \$60-oot hamps are employed, and the charging awticholoard is designed accordingly. Some machines are equipped with 24-eell batteries and other combinations. Confusion and sometimes damage result from attempts to charge these lower voltage batteries in garages where waxons with kinker voltages are maintained, and there are many serious disadvantages are maintained, and there are many serious disadvantages are propagated to the propagate vehicles of various voltages in the same garage. Low voltage lamps are burned out when they happen to get into high voltage waxons and low voltage members.

are spoiled in charging from high voltage switchboards.
"The number of cells required for a given voltage of

The number of cells required for a given voltage of Edian battery differs from that needed for the command would be different. It is possible, however, to fix upon a standard number of Edison and lead type cells which could be charged from the same switchboard. If all electric vehicles were enjutyed with either 44 cells of lead battery or 60 cells of Edison, it would enable the manufacturer of motors, etc., to produce these articles to greater advantage.

"Thus far the makers have not been very successful in scertling together on the question of standard latter vibrance, but this should be accomplished. It would be unfortunate if a cition were delayed, as in time the amount of obsolete material thrown on the serap heap will be far greater than it is today.

"If standard voltage should be adopted for all electric vehicles not only would batterles be interchangeable to a great extent, but also motors and possibly controllers. The



Anderson Electric in Service with Grocery Firm at Winnipeg, Manitoba, Having Given Excellent Satisfaction Index Severe Citmatic Conditions,

fact that an owner could exchange motors with his neighbor or re-equip an old cay with an up-to-date power plant, or with one part of it at a time, would place the electric in a unique position as compared with other automobiles. It would be a short sighted pulley for any manufacturer to take the stand that he preferred to construct his machine so that a motor, controller or intery made by another firm could not be applied to it.

"It is recognized that the electric vehicle is more fool proof and easier and more economical to operate within its radius of action than a gasoline car, and it would be folly nut to take advantage of the opportunity to make its most important features interchangeable, as this would add greatly to its popularity and hasten the time when the horse shall be permanently reflected to agricultural pursuits."

A newcomer in the ranks of commercial electrics is the Argo Electric Vehicle Commun, Saginaw, Mich., which concern makes two models of toon and 2son counts of $\widehat{\gamma}_{\alpha} \cap \bigcap Q[C]$

pacity, respectively. These vehicles utilize a shaft drive with a herringbone gent for the final reduction, which method is said to result in high efficiency, silence and com-



The New Pirestone Cushion Tire for Electrics: At Left, Repicting the Smooth Trend Type; at Right, the Anti-Skid.

pactness. The smaller vehicle is known as Type 10, has a wheelbase of 86 inches with tread of 54 inches, and is fitted with solid tires, 34 by three inches. The battery equipment is 28 cells, 11 plates M. V., Exide being standard, but Ironclad or Edison are furnished as extra. The body provides a loading space 90 by 42 inches.

The Firestone electric tire, made by the Firestone Tire & Rubber Company, Akron, O., with which electric vehicle users are familiar, has been improved in many ways, particularly in its easy riding qualities. This has been brought about by fitting the tire with a double or dual tread and by the addition of internal cavities at frequent intervals in the base, directly under the tread whereby the full cushloning effect may be secured. The dual tread was introduced for motor truck tires by the company about five years ago and was generally adopted. It not only provides a cushioning effect but serves to prevent skidding. By placing the cavities wholly within the tire an exceedingly neat and attractive appearance is secured. To obviate creeping and to ensure a firm fastening on the wheel the side wire method of attachment is utilized, and this form is in general use on heavy commercial vehicles. The tire which is manufactured in smooth and anti-skid tread, as depicted herewith, is known as the Firestone side wire cushion ejectric, and although it has been on the market some time it has not been widely advertised until recently.

The practicability of the electric commercial vehicle is demonstrated by a 1000-pound capacity machine in service

battery comprising 60 A-6 Edison cells, and during the six months it has been operated it has averaged from 40 to 50 mlies a day, during part of which time the temperature has been as low as 20 degrees below zero. In the accompanying illustration is presented the car carrying one of its usual loads, and in writing of the automobile the owner states it has given excellent satisfaction,

The growing demand for power wagons for light delivery work has stimulated the development of electric vehicles to such an extent that they are fast replacing the horse drawn equipment. Many department stores have adopted the electric after experimenting with various types of mechanically propelled vehicles, and in several cities large fleets are maintained.

The Kentucky Wagon Mannfacturing Company, Louisville, Ky., successor to the Electric Vehicle Company of that place, has brought out two new models of 600 and 1000 pounds capacity, respectively, and in the accompanying illustration is depicted a chassis of the former type. These are fitted with different body designs to meet the requirements of the purchaser. Without departure from thoroughly conservative practise, the maker has incorporated a number of refinements which make for long life, low cest of upkeep, high mileage, accessibility of parts and convenience to the operator.

The motor is a General Electric, 60 volts, and is suspended from the main frame just forward of the rear axle. l'ower is transmitted to the countershaft by a slient chala enclosed in a dust proof steel case. Final drive is by roller side chains, a system that makes for simplicity, efficiency and accessibility. The rountershaft is of the enclosed type and is carried upon ball and roller bearings. The motor shaft is mounted on Hess-Bright annular ball bearings. ltower roller bearings of ample dimensions are utilized in the rear wheels.

The battery is mounted on a sub-frame immediately in front of the countershaft. The 600-nound canacity model is equipped with 30 cells of the lead plate type while the larger vehicle is fitted with 50 Edison A-4 cells. This equipment is stated to give a mileage of from 40 to 50 under normal service conditions. When a higher mileage is desired a larger battery equipment will be provided. It has been the experience of the company, however, that the standard battery is sufficient to meet all usual regulrements.

The controller is of the continuous torque type, afford-



Chassis of 600-Pount Capacity Electric Helivery Wagon Brought Out by the Kentucky Wagon Manufacturing Company Which is Anticemble for the Aumber of Refinements and Accessibility of Mechanism.

with the A. Macdonald Company, wholesale grocer, of Win- ing three speeds forward and two reverse. Its location is nipeg, Manitoba. The vehicle, which is made by the Anderson Electric Car Company, Detroit, Mich., is litted with a

a departure from ordinary practise, as will be noted in the illustration herewith, being boited to the dash and protected by a short hood, and this part of the system with its wiring is easily accessible by the removal of the light dash partel which is held in plane by four thumb nuts. This hood serves to protect the headlights, meter and switches, and the vehicle body is free from wiring. This is a destrable feature, Inasmuch as the body may be removed after six bolts which hold it to the frame have been taken out.

The brakes are two in number and have liberal friction surfaces, the service member being of the contracting type operating on drams riveted to the counterbalt sprockets and actuated by a pedal through a flexible equalitier. The emergency member is of the expanding type operating on the rear wheels by a latched lever through, an evener which extends through the frame just above the counterbalt. Both brakes are eight inches in diameter and of two-inch face.

The frame is of channel section pressed steel, with three well gusseted cross members of the same section. Triss rods running from the forward cross member beneath the sub-frame and up to one of the rear cross members, prevent the frame from sagging, and permit of a light frame section.

The front and rear axles are of the 1 beam serion type and the forsings are weldless, from end to end. The sterlink knickles are of the reversed Elliott type. The springs are long, semi-elliptic, both front and rear. The wheels are of selected hickory, artillery type and are fitted with abold tires, 34 by 2.5 indress, though pursuanties are farmined and the selected fine type of the selection of the selectropic properties of the selection of the selection of the smaller, 56 the three selections of the selection of the utilized and this is mounted on the dash.

Steering is accomplished through a semi-reversible worm and sear mechanism, and this is fitted with hardened gears and ball thrust bearings. The steering column is raked at an angle of 25 degrees from the vertical and the usual wheel is provided.

Believing that the question of control had not received the deserved attention from designers, the commany has considered this subject carefully and located the driver at the left, placing the control and entergency larke levers as the right in the centre of the car. The control lever is operated in a gate, being moved forward for the four forward speeds, and back for the two reverse. Before pusstus from neutral to reverse a later must be raised and the side lever given a side movement, thus providing against accelerate reversal.

The emergency brake lever is operated by being moved to the rear. When the marbline is ar rest it will be noted that both levers overiny such a position as to insure easy entrance and egress of the operator from either side of the

In addition to the control lever, an emergency look assite is provided which opens the element when a planet to pilled out. The latter locks in open position and may be returned by the use of a Yalo key. This arraneoment prevents use of the machine by others than the driver or authorized person.

Liberal provision is made for ballecaring of all parts subject to the slightest were lirake and country see shafe are made hollow and provided with one large grease cap each by means of which hubricant is forced to all necessary points. The spring cyce are fitted with grease caps made integral with the hardened and ground shackle builts. Oil and grease caps are provided on all steering connections can be also be also also also be also because of the provided to the steering connections connected in a content of the provided provided to the provided provide

Two protected flush type electric health; the are mounted on the dash and the full likel its also operated by ciectificity. The standard type of body fitted to the 6-ob-pound vehicles is particled, and affords a clear boding space 50 linches long, 42 wide and 60 high. A similar body is provided with the larger car, this providing a space 53 linches long, 42 wide and 63 high. Other types of bodies are optional.

Electric vehicle manufacturers are anticloating with enthusiasm the 1912 Boston electric abov, which will occupy the entire Mechanics hullding in that chy from Sept. 28 to Oct. 26, inclusive. The event will include displays of every known application of electric energy.

About 15,000 square feet of floor space has been set

aside for the electric vehicle section, and nearly two-thirds has been engaged by manufacturers. All of the modern cars will be displayed, both pleasure and commercial, as well as the latest appliances utilized in connection with the machines and designed to bring about high efficiency

Visitors and prospective buyers will have every optortuality to see the machines demonstrated as well as every facility for consulting statistics and learning from others show well the electric automobile does its work. In addition to the cars, an electric vehicle garage will be maintained in the building, and although a sample, it will be a model for practical adoption. The costs of various items usually included in garage charges will be based on efficiency in the operation of the garage, and an effort made to demonstrate how one is run where highest ethiciency of service for customers with average profit for the management, is swered.

Machines for demonstration purposes may be cared for at this garage, and it is expected that the various large users of electric vehicles for commercial purposes will keep cars there during the month. That the show will be a de-



Depleting the Location of the Controller and Accessibility of Paris on Kentucky Wagon.

eited success as well as accomplishing much in interesting the multic in the electric automotive, is concluded by these familiar with the subject, and this will be due in a large measure to the efforts of the Edona Electric Humiliary Company of Hoston, which has been active for some time in promulgating information concerning the electric vehicle-

By Baker, New Encland manager of the General Vehicle Company, Long Island City, N.Y., gave a stereoutfoun illustrated lecture before the New England Foundatione's Association at Botton resemble. He showed a Large number of the Company of the Company of the Company of the Foundation of the General Company of the Company in the Company of the Company of the Company of the Hubertations of baggare and factory trucks, vs. of which have been Installed in the North station at Boston. The devices for Larguy work for equation of a uniociated speed and are capable of carrying a very nearly load. A form of carrier utilized by intraction of dealers also was evolutioned and

Dh god by Google

FIRE DEPARTMENT NOTES

The practicability of the motor propelled fire apparatus was demonstrated to the citizens of Pittsfeld, Mass., revently when with a gale blowing, fire broke out in a dangerous locality. The automobile made a record run, averaging over 40 miles an hour and reached the scene of the blaze as quickly that the James were estimatished before they could in the building. Chief Sheyard of the department stated that the machine more than paid for itself at this fire alone.

The municipal authorities of Lynn, Mass., which is considering the purchase of motor fire apparatus, were given a demonstration of a 5th horsepower vehicle made by the Mais Motor Truck Company, Indianapolis, Ind. The classis is specially designed for this work, is fitted with the Mais Internal gear drive and is guaranteed to travel at a speed of 30 miles an hour for fire department, work.

The trials were on Cedar, Greenwood, Mansfield and Hudson street hills, John C. Welsh, the Lyan representative of the company conducting the tests. All of the bills were climbed easily and the city authorities were very much pleased with the demonstration. It is proposed to fit the bodies of the present horse equipment to a motor car clissle. pelled apparatus, and this movement is not confined alone to the large cities as the small towns, also are adopting the automobile. Many cities have expended large sums for modern horse drawn apparatus such as engines, etc., and tiese only lack the proper means of transportation to give efficient service. To diseard this means a considerable loss as well as outlay of money to install the more modern equipment.

To devise a mechanically propelled vehicle adaptable to the horse draws type, Charles H. Martin experimented with many designs and after much labor produced the Marful three-wheel tractor, a form of automobile constructed to haul the horse type of vehicles. The invention was taken up by the Knox Automobile Company, Springheid, Mass, up to the Knox Automobile for apparatus, and subperfed to a series of automobile for apparatus, and subperfed to a series of series and of which the tractor stitutions successfully.

The device conducts of a steel frame, carrying a motor and transmission machinery, which is placed in front of the fire engine or any either apparatus designed to be horse draws. In the accompaning illustration, the tractor is geared to the front wheels and asle of a steam fire engine, and it will be noted that it is supported in front by a single

wheel, which is ntilized for steering and which permits of a fivewheel combination to be turned in a narrow street.

This wheel is sustended upon liberal springs which reduce vibration to a minimum and the engine and working parts of the design are protected thereby from road shocks. Drive is by side chains to the traction wheels of the fire engine and suitable springs are fitted, these being said to be fully as resilient as those of the pleasure car. It is claimed that the members which support the tractor on the axic act us a cushion and that a considerable advantage is gained in starting a heavy load from a standstill. A sliding gear transmission facilitates this operation.

The tractor was exhibited at the recent New York show by the Knox Automobile Company, and attracted considerable attention from those interested in fire pro-

tection as every city in the country has horse drawn apparatus of proven worth that does not leid theeft to ordinate automobile construction. In testing out the device it was automobile construction. In testing out the device it was driven over curbs, through plowed fields and sand hand, and dld work successfully that an ordinary commercial car would not be railed upon to do.

Chief A. V. Bennett of Birmingham, Ala., which city is equiliped with several pieces of motor propelled fire apparatus, has been presented with another check for good work performed by his motor car department at fires. During October the automobile apparatus responded to 105 alarms, ran 1930 blocks, laid 15,250 feet of hose and used 366 gallons of chemicals.

Westfield, N. J., has placed in service its new Webb motor free engine made by the Webb Motor Pire Apparatus Company, St. Louis, Mo. It is guaranteed to deliver 700 aglions of water a minute, taking surtion from a plug of 45 pointed, pressure and discharging through two 50-feot siamesed into one line, bulging into one two-line thy, or 5.50 gallons, taking surtion from an open body of water with not over a pine-few lift and discharging through two



Combination Hose and Chemical Wagon Made by Martin Carriage Works, York. Penn.

The Martin Carriage Works, York, Penn, maker of commercial vehicles, is manufacturing automobile fire apparatus and in the accompanying illustration is depicted a combination bose and chemical wagon produced by that company. The vehicle carries a large chemical tank and hose and the usual equipment in the shape of inders, are and other fire fighting appliances. The body accommodates several men, being romys and well designed for the purposes for which

The vehicle is propelled by a four-cylinder, four-cycle, water-cooled more, with a 4.5-inch bore and five-inch stroke, rated at 36 horsepower, and its location is under the seat. Izuition is furnished by a magnetic owith battery in reserve. A multiple disc clutch is employed and a scientive sident governed and sevent with the second of the second of

Throughout the country there is a growing tendency to replace the horse drawn fire equipment with motor pro-

50-foot lines slamesed into one line playing into one twoinch tip. The car has a speed of 35 miles an hour and is equipped with Firestone tires, made by the Firestone Tire & Rubber Company, Akron, O.

The citizens of auburn, R. 1, endeavored to bring about the purchase of a piece of a submobile apparatus has fail but the city council refused to take action. A fire broke out recently in a part of the town some distance from the station, and by the time the horse drawn apparatus reached the seene the fiames had gained such headway they could not be checked and the property was destroyed. In commenting upon the biaze a local paper stated that had the department been equiliped with a piece of automobile apparatus the home would have been saved, and that real paratus the home would have been saved, and that real the proposed to have automobile apparatus even if the residents have to raise the money by subscription.

Manufeld, Mass., is well pleased with its installation of motor propelled fire apparatus which has been in service over a year. The crist of maintenance has been \$20 and expense of operating \$30, a total of \$110. During the year the machine responded to 50 alarms, covering both inside and outside the fire districts and 35 of these tires have been taken care of by the spuad manning the motor car. Chief King says in his report.

"Experience has fully demonstrated the fact that motor lire apparatus is the most economical, practical and effi-

Tenn.; New Britain, Conn.; Jacksonville, Fla.; Bridgeport, Conn.; Haverhill, Mass.; Rochester, Minn.; East Islip, N. Y.; Davenport, Ia.; Ottawa, Kan.

The White Company, Cleveland, O., maker of pleasure and commercial vehicles, recently shipped (we pieces of motor propelled fire apparatus to its New York office. One of the machines is a chemical ensine designed for the Young America Hosse Company in Poughkeepies, and the other is for the department in Mount Vernon, N. Y. The bodies were made in Kanawsia, W. Kanawsia, W. Sanawsia, W. Sanawsi

Two new lire companies have been placed in commission at placed in Commission at placed of automobile fire apparatus which is a combination engine and hose wagon. The different companies of the city will be instructed in the use of the machine, as it is the plan of the chief to eliminate the horse drawn equip-

Indianajodis, Ind., which is Installing several pieces of motor propelled apparatus, had a bad year in the mutter of fires. With less than a month remaining of 1911 the reserf of fires exceeded that of the previous year by more than 100.

Leominster, Mass., will place in service shortly a motor jumpedful combination have and chemical wagon, the money



The Martin Tractor Attached to a Former Horse Brawn Steam Fire Engine, Depicting One of the Man) Uses to Which the Product of the Knox Automobile Company May He Applied,

clent equipment and I hope it will not be long before appliances will be perfected so that all our apparatus may be equipped with motors." In addition he states that the flying squad has lessened by over one-half the work of the other members of the department.

Pontiac, Mich., has instilled its first piece of automobile fire apparatus, the chief of the elepartment estimating that It will take the place of three bories and that it will be used to cover the entire city. It is a combination hase and chemical wagon, made by the American-La France Fire Engine Company of Elmira, N. V., and has been peared down to a maximum speed of 40 miles an hour. The expects that if a haze cannot be extincished with its contents at betting the control be extincished with its contents at the time to turn on the water. It is probable that other motor fire apparatus will be that alled later.

The following cities and towns have made appropriation for the purchase of motor propelled fire aggrards or are considering the same: Lynn, Mass; Riverskie, Cal; Augusta, Ga; Akron, O.; Paducah, Ky.; Puchlo, Col., Hillsboro, Cal.; Hinghamion, N. Y.; Ballas, Tex.; Nashville, to purchase which was raised at a special meeting last summer. It is probable that a special driver will have to be secured as the firemen driving the horse drawn vehicle do not care to operate an automobile.

At a rewell meeting of the city council in Princeton, ind., a member of the council moved for the debelarse of a special committee appointed the anothic ago in buy horse drawn equipment and suggested that another committee be empowered to investigate the advisability of securize motor propelled apparatus. The motion was carried and the major will serve upon the committee.

William R, Turker, so return of the committee on numining all affairs of the Philadelphia Board of Krale, in a recent communication to Herman Leeb, director of sugilies, requested the city to provide uses the anomalous for the department and modernite the service. The beamer director, before retirement, planned to add eight pieces of the lorse drawn type, but upon the request of the Beard of Trade delayed action. In its letter, Mr Taylor galled attentions to the puncerous either within a radius of two infles of Philachelphia that lays installed pain models are accurate.



MECHANICAL NOTES ANT TIPS FOR DRIVERS



REMOVING TIRES FROM RUSTED RIMS.

Pneumatic tires which have been in service for considerable time and which have not been removed since being fitted, frequently give the operator trouble when an inner tube is replaced or a new member put on. This is especlally true if the car be operated in all kinds of weather. Moisture finds its way between the shoe and the rim and a condition arises known as freezing of the tire. To remove one of these tires is a difficult task and the ordinary tire tools fail to start the member. If the shoe be in good condition one dislikes to try methods which would be likely to injure the casing.

An instance of a frozen shoe which resisted the efforts of the garage attendants was noted by the writer recently. The tire had been in service over 3000 miles during which time it had not been punctured or removed. About every

scheme known to the workmen was tried but without avail. An owner of a pieasure vehicle quickly solved the problem with a Fisk tire tool that is utilized with the bolted-on

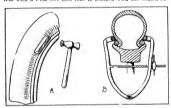


Fig. 1-Some Preumatic Tire Removing Hints: A. Using Black and Hammer: B. Clamp for Starling Shoe Frozen to Rim.

type of casing and which is depicted at Fig. 1 B. clamped to the tire with blocks of wood interposed, as shown in the sketch, and when the device was operated the bead was started. A larger block of wood and a hammer were ntilized as shown at A and the refractory shoe soon yielded to the treatment.

It was found that the rim was rusty and the operator decided to remove the other tires, after which the rims were sand papered and treated with a coat of graphite and oil.

IGNITION TIMING.

Although the general practise is to equip the commercial vehicle with a magneto for ignition purposes there are many cars being utilized which are fitted with timers or commutators, coll and either dry cells or storage batterles as a means of current. Others employ both systems, providing the timer or distributor for starting purposes and relying upon the mechanical generator for operating the motor.

With the former type there is more or less wear and parts subject to friction must be replaced, this depending upon the construction of the device and care given it. Frequently the operator who attends to the minor repairs of the automobile will remove the timer without considering Its proper replacement, and unless he is familiar with the

principles of ignition timing he will be obliged to call upon the expert repairmen

A knowledge of both valve and ignition timing will be valuable to the operator as not only will it be of assistance when overhauling the power plant, but in the event of trouble upon the road it will enable him to make the necessary adjustments and complete his trip.

By ignition timing is meant the firing and expansion. or explosion of the charge of compressed gas in the combustion chamber, not the time of the spark. There is a difference between the time at which the electricity jumps across the gap and that at which the charge begins. There is also an interval between the time of breaking contact at the timer and the ignition of the gas. This is termed a lag and to offset this the commutator is moved to bring about an earlier break, which is accomplished by means of rods connecting with a lever on the steering wheel. This is known to operators as advancing the spark. This advance may apply well where a magneto furnishes the current.

In order to obtain the greatest efficiency of the motor the volume of gas should begin to expand as the piston starts to descend; theoretically at the top of the compression stroke. Where a hattery, timer and coll are utilized, there is a certain delay in the electricity reaching the plug as the current flows through first the primary and then the secondary paths before the spark takes place at the points of the plug.

This interval varies according to the number of revolutions of the crankshaft. Thus, when the motor is running at high speeds the spark lever is further advanced than at low. This setting ahead differs according to the design of the motor, also the amount of compression, density of gas charge and condition of battery, coll, etc., will have to be considered.

For example: With an engine running at 1000 revolutions a minute the spark should take place when the piston has about .625 inch to travel before completing the compression stroke. These conditions, however, do not exist when the engine is operating at a slower speed or when starting.

There are several methods of timing but the easiest for the amateur is by the piston. As cylinder No, 1 is usually nearest the radiator it can be utilized. If the former be fitted with a priming or compression cock, it is an easy matter to locate the exact position of the piston. A bicycle spoke or a piece of drill rod is inserted through the petcock as the cylinder is compressing. The latter may be located easily by opening all of the petcocks with the exception of the first member, and by turning over the motor, when the resistance will be noted

The petcock of this cylinder is then opened and the rod inserted, and by a further movement of the starting crank the rod will begin to rise until it stops. This denotes the top of the compression stroke. The rod should then be nicked to indicate this position, and allowed to drop 5 lnch; that is, the piston is permitted to descend this distance

While this is a fairly good retard, it is safe for starting purposes and can be offset by the advance of the timer under the usual methods. Having located the position of the piston, the spark lever on the steering wheel is set back or forward, as the case may be, as far as it will go. Having fully retarded the lever the timer is adjusted so that the contact roller just touches the metal block which in turn is connected to the primary wire of cylinder No. 1, as shown In Fig. 2 A. The commutator is then locked by set screw or nut. In multiple cylinders it is only necessary to time one as the others should be correct. They can be checked, however, if so desired.

When the motor is not fitted with compression cocks or occurrence of the rod, the centres of the configuration is given by the centre of the centre of the centre of the whole may be utilized. In a four-cylinder motor two pistons are up and a like number are down when on deads centres. With the explosions occurring 1, 2, 4, 3, as shown in the drawing, the piston in the first cylinder has reached the top of compression stroke and travelled downward about the top of compression stroke and travelled downward about the top of compression stroke and travelled downward about the top of compression stroke and travelled downward about which depicts a crankshaft revolving clockwise.

Assuming the centre mark is correct, and not being able to check the piston lead by the usual method, it will be Recessary to figure it out by noing the diameter and circumference of the flysheel and stroke of the piston, in order to mark off the distance on the periphery of the former. Thus, if the diameter be 15 inches the circumference.

As half a revolution is made to a stroke, or 180 degrees, one-half of the above figure would be 23.552, where is in turn divided by the length of travel of the piston, 4.5 inches, giting approximately 5.23 inches to be measured off on the flywheel, as indicated in the drawing. This will about equal the 5-inch downstroke, as previously ex-

it will be well to add another .5 inch or more, unless it be accurately figured. Longer or shorter piston travel and different sized wheels may be computed on the same

in timing, it must be borne in mind that any wear of or the connecting root bearings will alter the relative position of the flywheel to the indicator, and while this may not of the flywheel to the indicator, and while this may not affect the setting of a timer to any great settine, it would nailter that of the valves. To insure accurate results the tuning should be obtained from the maker and by utilisating the flywheel it can be checked and remarked if necessary.

LINING UP CHAINS.

Where the chain drive is utilized, especially the single member, it is essential to line up the driving and driven sprockets to obtain the best results. Devices are provided for adjustment, but if the approckets be suspected of being out of alignment they may be tested easily by extending a piece of string from the outside of the test of the fortward to those of the rear member. The twine should be dropped below the top of the testi and drawn (tabit). If the string bear evenly on both sprockets it may be assumed that they are in line. A space between the twine and the metal will denote faulty adjustment and this should be remedied.

COLD AFFECTS GAS TANK PRESSURE.

The Prest-O-Lite Company, maker of gas tanks of that name, announces that the pressure of these members is

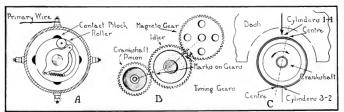


Fig. 2—Some Ignition Timing Suggestions: A. Position of Timer with Contact About to Breakt B. Marking Genra Which Drive the Magneto; C. Dash Device and Diagram for Marking Time of Ignition.

hasis, but while this method may be utilized when the timer becomes loose while on the road, it is not recommended. Should the timer be set too early a backfire will ensue and the operator might be injured in cranking.

Where the flywheel is not marked and the rod cannot be employed, it will be necessary to remove the lower half of the crankcase or an inspection plate to determine the centres. The piston of cylinder No. I should be brought to the top of the compression stroke and the rim of the flywheel under the indicator nicked or marked. A hafturn will bring the piston of the second cylinder at dead centre when the wheel should be marked. This will give

Having obtained these it will be an easy matter to check off the joint of contact on the timer and to note it on the flywheel. All four may be treated similarly. This will also aid in timing the valves, and if the motor is a new one and the flywheel not marked, it will not be difficult to place flyures on.

Sometimes in overhauling the motor the amateur neglects to note whether the gears utilized to drive the magneto are marked. Usually the proper mesh is indicated on the teeth as shown in the illustration at B, which depict a conventional method of assembly. If the wheel be not marked it should be with a prick punch. One tooth should be nicked on the intermediate sear and another indenation and another against the space is the best way. The took and another against the space is the best way.

affected by temperature. The correct pressure should be 225 pounds or 15 atmosphere as 65 decrives Phirthelic. When the tank is chilled, however, the pressure drops rapidly, and a decrease of 49 degrees will cause it to drop one-half. Nine to 19 atmospheres, or from 135 to 150 pounds, in cold weather I not utreasonable. To prive the effect of temperature upon the pressure, place a tank that has and note the results.

KENNEDY HEADS ALCO COST BUREAU.

W. P. Kennedy has been appointed head of the transportation cost bureau of the truck department of the American Loromotive Company, New York City, and will devote his energies to transportation problems with which subject he is thoroughly conversant, having been connected with the commercial car industry for some time. He states that there is a tremendous waste of money through the failure of the users of the horse drawn equipment to sysproper use of the automobile a saving from 15 to 40 per cent, may be effected.

The object of the cost bureau is to analyze the various hauling systems in a scientific way and tabulate the results carefully, providing setual figures and working diagrams, and demonstrating the saving of motor cars over horses.

Digital by Google

voi. iii

NO 9

AUTOMOBILE JOURNAL PUBLISHING COMPANY Times Bldg., Pawtucket, R. I.

William H. Binck, Treasurer. D. O. Binck, Jr., Secretary, Publishers of

THE AUTOMOBILE JOURNAL THE ACCESSORY AND GARAGE JOURNAL

Those Pawtacket 1000

CARL A, FRENCH. C. P. SHATTICK. WILLIAM W. SCOTT

ADVERTISING DEPARTMENTS

New England John W. Queen, 6 Bencon Street, Boston, Mass Causes) States

W. R. Blodgett, 25 West 42nd Street, New York City. Thone Bryant 3728.

Western States-G, A, Eldredge, 304 San Building,

Detroit, Mich. 'Phone Cherry 1953, P. G. Lurian, 1614 Belle Plaine Ave., Chiengo, Ill.

PUBLISHED THE FIRST OF EACH MONTH.

SUBSCRIPTIONS

The United States and Mexico, the year, \$1 in advance: Canada and Foreign Countries in Postal Union, the year, \$2 in ndvance. Fifteen cente the copy

ADVERTISING RATES:

Information given on request. All advertising copy must reach
this office not later than the 25th of the month preceding.

Anonymous communications not considered. Correspondence on
subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire, and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions

Entered as second class matter, February 25, 1911, at the Postoffice at Pawlucket, R. I., under the Act of March 3rd, 1879.

PROGRESS REVEALED BY SHOWS.

Those who have been watching the commercial vehicle side of the industry cannot help but be impressed with its importance as reflected by the present show season. A little more than a year ago, when it was decided to hold separate exhibitions for industrial transports in New York and Chicago there were many who questioned the wisdom of the innovation. They were certain that the business of producing and selling this type of motor conveyance had not progressed sufficiently to warrant the undertaking.

But the success of the truck shows, so-called, in the two big centres where the scheme was given a trial, indicated clearly that while the motor truck situation might be considered more or less in its infancy, the possibilities of interesting prospective purchasers were infinitely larger than had been anticipated. Compared with the business transacted at the pleasure car displays, the result was such as to leave no possible room for doubt that the innovation was timely and well worth continuation.

The increased representation at the two national exhibits this year is sufficient indication of the manner in which the opportunity for displaying motor trucks is regarded by the manufacturers. That they have not misplaced their confidence in the buying public is borne out by the attendance and business transacted. The industrial transport is an established institution, and the commercial vehicle show may be regarded as a permanent fixture. The production and sale of these cars no longer is an infant industry and the success of the present show season is but one of the indications

SERVICE AN IMPORTANT FACTOR.

of its wonderful progress.

Last summer, during the protracted heated period, large unmbers of borses were overcome in the cities. especially, and the increase in the sale of commercial motor vehicles was decidedly marked in consequence. The cold wave of the past month, accompanied as it was by snow and ice, presented still another argument

in favor of motor trucks, and the buying public was not slow to appreciate its essential points. Coming in connection with the national show in New York City, it is probable that it will have a decided effect mon the business to be done in this field the coming season.

Whether or not the motor truck is able to effect a saving in dollars and cents, although this position can be proven in nearly every instance, there is the matter of service to be taken into consideration. Antemated methods of doing business must be relegated to the rear, so soon as it is demonstrated that something more modern is offered. There can be no doubt that the nower wagon solves the question of service under any and all circumstances, and is not in the least affected by the weather.

When the streets are filled with snow and ice, as when the heat is so intense that horses cannot be relied upon to do their work, the motor truck covers its route as regularly as under the most ideal conditions. Those who have been accustomed to gauge their business canacity by the ability of their horse drawn equipment to meet these conditions, are compelled to realize that the firm which employs a thoroughly dependable system of delivery, for instance, secures the business which rightly belongs to them. The obvious solution is to meet the problem in the same manner as the competitor, and since the motor truck has reached a point where it can be depended upon, there is little reason for failing to grasp the opportunities presented.

MEETING THE BODY PROBLEM.

There seems little doubt that the question of bodies will be of decided moment throughout the coming sea-This applies to all forms of transports, but in no case is it more true than with the smaller wagon, such as may be used by retail stores. In many instances these firms have built up a delivery system after much careful thought and experimentation, and it is hardly to be expected that they will consider the newer method of transportation without indging its effect upon this system.

It may be possible to evolve some standard types of bodies which will meet a large number of requirements, but it is a situation which calls for much careful consideration by manufacturers. It is by no means essential that the buyer shall rearrange his whole method of doing business in order to avail himself of the possibilities offered by the modern vehicle. It is necessary, therefore, for both sides to give thought to the question of bodies before determining the suitability of the particular wagon for the work to which it is to be put.

This means quite as much to the maker as to the purchaser. One delivery wagon carefully placed may mean the sale of a dozen others-perhaps many more -because there are few business men who are unable to influence their friends in this regard. On the other hand, a mistake in the equipment of one machine may be sufficient to affect as many sales in the opposite manner. The importance of the situation cannot be over-estimated.

RECENT MOTOR VEHICLE PATENTS



Valve Grinding Device

In grinding valves of the poppet type an oscillating motion of the tool is desirable. A parent has been granted to De Will G. Vaughn, Richmond, Va., assignor of oneisalit to Dallas A. Shaffer of that city, for a device which embodies this feature. It comprises a shaft fitted with a worm which actuates a longitudinal sleere and rotates the shaft. A tubular extension is provided with a bit and inuolin is imparted to the latter by means of a handle. Each portion of the two-part telescopic shaft rotates independently and one is fitted with a number of longitudinal slots at the part of the shaft of the shaft of the shaft of the control of the shaft of the state of the shaft of the shaft of the shaft of the state of the shaft of the shaft of the shaft of the stating the connection. The oscillating movement is obtained by longitudinal pressure and release.

Electric Speed Limit Signal.

A patent for a speed limit signalling apparatus has been granted Fabius M. Butler, Ista'd City, Neb, which is operated by electricity and rings a bell when an indicated speed is reactived by the vehicle. The dial of a speedometer is fitted with routact members as is another part, these being connected electrically. When the indicating hand of the speedometer touches the 10-mile contact, for example, the current flows to the bell. A lever is attached to the regulating device and may be set to sound an airsm at any desirted speed. This arm is connected to a visible index, which shows but one number at a time, and is provided with an electric lame.

Automobile Hood.

An automobile hood so constructed that Its blinges are joint tight and weather proof, has been designed and patented by Henry G. Baum, York, Penn., assignor of one-half to the Pullman Motor Car Company of that place. The close joints are obtained by every alternating lip of the members being rolled backward upon itself to engage a binding, or pivot rod, and the remaining hip extending un-

der the surface of the corresponding rolled members.

Resilient Wheel.

Isaac Jay, Pendieton, Ore, has been granted a parent for a resillent wheel, the rim of which is fitted with a number of U shaped pieces in pairs and to these are bolted one end of eight curved spokes. The other ends of these members are attached to the hub by plates and boils.

Automobile Buffer.

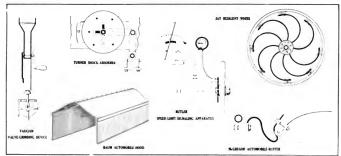
A novel form of automobile buffer designed for motor vehicle operating in beavy traffic, has been patented by Alian L. McGregor, Chicago. The buffer bar is carried in clamps which are shorted and tocked by a bolt and aut. To this member is attached one end of the two S shaped springs. The other ends are fitted to clamps bolted to the frame extension in proximity to the spring.

Turner Shock Absorber,

A shock absorber operating on the friction principle has been patented by Harry C. Turner of Los Angeles, Cal. II. Consists of a stationary case with a revoluble sleeve mounted therein, and an arm attached to rotate this. The extension is pitorally mounted and connected with a similar member fastened to the spring. The interfor of the case spring pressed does, which encage it and rotate another movable part. This is fitted with a number of operation of the case of the control of the case which is fitted with a control operate in different directions. Contact between the state of those parts of the control of the c

MONTREAL SPACE IS LIMITED.

The week of Feb. 3-10 has been selected as the date for the annual national Canadian automobile show in the Drill Sbed at Montreal. The demand for space has exceeded all previous records, and Manager E. M. Wilcox is having trouble trying to locate many who desire opportunity to make display. A number of vehicles will be shown in Canada for the first time at this exhibit.



PROSPECTIVE PURCHASERS' GUIDE TO OFFERINGS

Tabulated Detailed Specifications of 1912

				POWER PLANT							LING		TF	LANSI	IISSION
MAKE.	Load Capacity.	Cylinders.	Sow Cast	Bore	stroke	Power	Carburetion	gnition	Lubrication	Circulation	Radiator	Clutch	Form	Speeds	Location

Half-Ton and Less.

New Ere*	400	1	1 1 6		Delo	abulash IAir	1	Hand	Plan 1	2	With Motor
Maxim*	500	Sep	1.2	4 5 a Conn .	Magneto	Splash Air			Hydrau		With Motor
Reo	500	1 .	4.7	6 0 12 0 Osn	Juney Spark	Force Feed. Thermo		Disc	Plan .	2	With Motor.
Auburn	600	Sep.	4 1	1 7 13 6 Float Feed	Jump Spark	Force Feed Thormo	II comb	Disc	Plan	2	Amidships .
Brush	600	1	1.0	5 0 H0 0 Kinsston	Bos. h	Force Fee! Air	1	Plate	Plan		With Motor
Duryes	600	2 Sep	3 7	t 7 12 Ollfriger	Jump Spark	With Fuel Air	1		Roller		C S
Kearns	600	t Sep	8.0	4 0 Du Obs bebler	Unisparker	Aug Aug			Friction		Amidahips
Best	800	2 Nep	8.5	4 5 12 0 Kingston	Dual .	Pump Thermo	F Tube		Enction		Amidship
Chicago Bus	800	2 Sep	4 1	4 0 t4 0 Float Feed	Tump Spark	Spl & Pumi Air			Friction		
Detroit	800	2 Non	4 0	4 0 16 0 Float Fee!	Hoseli	Force Feed Thermo	Tubular	Disc	Plan .	2	At Jackshaft
Lincoln	200	2 Block	4 1	4 0 14 0 % hebler	Jump Stark	Furce Feed LAir			Friction		The House
McIntyre	800	Sep	Li i	3 7 13 6 Float Feed	Jump Smark	Force Feed Thermo		Disc	Plan	2	With Jacksh.
Overland	800	4 Sep	140	4 5 30 O'Schebler	Split-lori	Force Feed Thermo		Cone	Select	3	Rear Asle
Acorn	1.000	2 Sep	1 6 0	4 0 20 0 S. Schler	Turnty Smark	Force Feed Thermo	Tubular		Friction	l	Amidship
Beyater	1.000	4 Hlock	1 5 5	5 0 20 0 First Feed	flow h	Solash . Thermo	H'cumb	Plate	Plan	2	Amidship
Blacker	1.000	2 Sen	4.0	a 0 lit 0 5 helder	Hattery	Stdash LAir		Hand	Select 1	2	Amidship
Board	1.000	4 Block	1 7	5 2 28 0 S. Velder	Bosch	Force Feed Pump	Hicomb	Cone	Select	3	Back Motor
Buick	1.000	2 Sett	1 1	5 0 22 0 5 belder	Remy	Force Feed Pump	Tubular	Cone	Plan	2	With Motor.
Champion	1.000	4 Pairs	4.2	5 0 15 0 Float Feed	Simms	Force Feed Pump	Tubular	Disc	belect.	1	Amsdahip
Cino	1,000	4 Pairs	4 3	5 0 40 0 Strumbers	Remy	Sol & Pump Pump	Tubular	M D. c	Select	3	Amidship
Economy	1.000	2 Sep	4 5	\$ 0 20 D belder	Magneto	Force Feed Pump	Heomb	Cone	lilan	2	Amsdship
Geneva	1,000	2 Sets	1 4 2	4 5 20.00% believ	Blosch	For a Per-1 Pump	Tultular	Disc	Plan	- 2	With Jacksh.
Gleason	1.000	2 Sep	4 0	4. 7 20.0 > hebler	Remy	Farce Peed Thermo		Disc	Select	1	Amidship.
Hatfield	1,000	3: Ser	l i i	A 0 20 Ollfulley	Bon h	With Fuel Air -		1	Enction		
International	1.000	2 Sep	1 6 0	4 0 14 0 Schebler	Bosch	Mechanical Air		Band	Pat	2	Back Motor.
Jons	1.000	3 Sep	1 7	A 2 22 Obshelder	Bosch	Force Feed Pump	H'comb	Plate	beleet	3	Rear Axle
Lambert	1 000	2 Sep	1 6 2	4 0 20 0 Schelder	Remy	Pump Pump	Vertical		Priction		Amidship
Mercury	1.000	2 Sep	1 4 2	4 DITA O'Clan	Battery	Sel & P F Air		Plate	Plan	2	With Motor.
Merit	1.000	2 Sep	4 7	A 2 18 0b helder	Immo Suari.	Sol & P P Air		Disc	Friction	Ā	Amislahip
Modern B	1.000	4 Block	1 1 2	4 5 22 0 Finat	Eisemann	Spl & P. F Pump		Come	belect	i i	Amulshin
Regal LB	1.000	4 Pairs	1 4 1	4 0 30 0 Ft of	Michigan	Sel & Pump Thermo	Tubular	Cone	Select .	l î	Rear Axle
Rogers	1.000	2 Sep	113	4 0 ts 0 Kingston	Boult	Porce Pecil LAIR	1		Priction		Amidshap
Schmidt	1.000	2 Sep	1111	4 2 18 0 % helder	Semms	Sol & F F Air		Disc	Plan	2	With Motor
Sullivan	1.000	2 Sep	1 5	4 5 18 0 % brbler	Bosch .	For a Feed. Thermo	Tubular	Cone	Plan	1 3	With Motor.
Van Dyks	1 000	2 Sen	116	2 0 22 0 % helder	Magneto	Mechanical Pump	Tubular		Friction	٠.	Amidship
Verren	1.000	4 Block	lió	4 s in a Floor Fee!	Box b	Spl & Pump Pump		Comp	Select	1	Amidship

Half-Ton to One Ton.

uburn .	1 1,200	2 Peti	14114	7 120 OfFloat Pee-1	1Rem	(Frenc Feet	Air	T	1	H'lan .1	2	With Motor
ichert	1,250	2 Sec		0 20 O Carter	Sy57, 41	Solash		Tubular		Plan	2	With Jacksh
tlan	1.500	Pairs	1 4 5 1 4	5 20 0 Float Fee!	Ato : Kent	With Real	Pump	H'comb	Plate	Select.	1	With Motor
artercar		2 Seti	1.5 5		Rem.	Mechanical		Tubular		Priction		Amidshits
hase D	\$ 500	1: Sec	14111	0 20 0 Hulley	Herman St.	With Fact	Air			I'lan.	2	With Jacksh
oleman		2: Sep		5 20 0 Float Pee-1	1 ///	With Fuel	Pump		Plate	Sclost	2	Amid-hip.
Cortland	1 500	2 Sep	11111	2 tr Breeze	R	Fotic Fee	Thermo	Tubular	d'inne	Plan	- 2	Amilship
Crown	1 500	A Section		5 26 Ob bebler	He-	Mechanical			M Dasc	Select 1	- 1	Amidship.
Dart	1 51100	2 50	1 3 5 13	1 16 1 Float Fee I				H web	Disc	F.an	- 5	With Motor
Denniston				1 13 i Float Fee-1		1 Mrc Lec 1		H were	Plate	belog t	4	With Motor
	1.500		40 4			and & Pursu		T b-lar	Disc		3	Rear Axle
aylord		4 Pairs			Rell	Total Per	Pump			Select	.5	Real Write
deal		5 Pairs		2 21 f Float Fee!	Br= 1	no &FF	Therm	Turclar	TIAC	Select	- 3	With Jacksl
ohnson		4 Pairs		2 II 0 Strumbery	() (- 1	dash	Pump		Cone	Select	3	Amadahap
Cearns		1; Set	8 1 8		11474 F	With Fuel	Air			Priction		
Conelkar	2 500	4 Pairs	4 2 4	2 D ASTER TO	Bor F	plach	Pump	II' omb	Cone	Select	3	Amidship
incoln	1 (11)	2 Hlnk	4 1 6	14 (15) he'ler	Lat - i	Force Fee I	LAI-			Priction		
.ippard-Stawart	5 5000	4 Block	1 1 1 1 1	t 20 0 Fl at F-	11-1					Select	- 3	Amidship
delatyre.	1.500	2 Sen	1 5 2 1 4	22 CFloat Fee	Bruce	Salash	Thermo	Tubuar		Plan	2	With Jacks!
faytag-Mason	1.500	2 Sep	1 - 0 3	= 20 Clbs buller	I - Nark	SHAPP	C Pump	Verteral	Cone	Plan	2	
Sepomines	1.500	J Pairs	1 4 7 4	5 25 O Subelike	A MET AND	Parin			17.74	Select	- 1	With Motor
lodern	1 500	4 Block	1 1 1 5	10 b Ploat Fee	Fr Stark	SIAFP			Cone	Select	1	With Jacks
Conitor	1.510	4 Sep		0 20 1 Scheldet	Ph. or	Futce Pred		III mh	Cone	Plan	- 5	Ami-lalup
fora .	1.5 0	2 Sct		3 14 DE Perl		Force Fee			hac	Plan	- 6	With Incks
Oliver	11.5 0	2 Sc	3013	11 21 P at Fee		Force Feed				Plan	- 6	With Motor
hiladelphia	1.500	4 Pair	10 4	25 6 Schelder	Mea Bear		Pump	I contract	Plate	Select	- 4	Amriship
н Р			10 4	25 fills helder		relash				Select	3	
	1.531	4 Block		t in F at Fee	Stitler	1 & F F	Pump	Tubular	Disc		3	With Motor
Reo				0 12 Than	armii Nisark	Spl & F F	Thermo	Homh	Disc	Plan	Z	With Motor
ampson		2 Sen	4 9 4	1 18 Float Fe	an Sark	1 & P P		Tabular	Plate	Select	- 3	Amidship
chacht	1 6019	4 Block		0 10 Schebler	Men	al & Posse	4 P mp		time	Select	3	Amidahip
ullivan	1.5.7	2 500		5 I.S. Schelder	Smark	For e Fee	Thermo.	Vertical	Cone	Plan	2	With Motor
eerac		2 Sec		0 20 fillfeller		Wish Forl	Air			Plan	2	With Inches
SCROF	2 500	1	1 7 1	125 Schebler	\$	NIBPF	Fatter		Disc	Select	.3	
Webster	11,500	2 Illion's	4.5 1	ti 16 % S be blow		Parise Peed	Air-			Plan :	2	Amidship
White	1 / 5010	A Block	1 1 6	12 11 1 1 1 1 1 1 1		MARP			Gane	Sclect	4	Amidship
Whitesides	1 / 51137	4 Block	4 = 4	Marcel Marcel	Sout Serv	-la-t				Plan	2	Amelship
Willet		31 Sen	13 = 13	T to Plant Per t		For Fee!			Plate	Select	1	Amelship
Adams		4 Blues	1 1 5	The Konsen		LAPP			Disc	Select	1	
Atterbury		4 Blo b	10 1	- 25 hebles		A P P		Prob lar	Plate		1	With Motor
Resemen		4 Block	1 1 1 1	2 2 - 515 - 171		Force Feed		violar		Select	1	With In ky
Blackar		4 Pare	1 1 5			Intro Feed		I SOUTH	Band		3	with Jacks
Board						3 7					3	Amidship
			4 1 5	112 - In habitur		Force Fee!				Select	18	With Jacks
Cass		a Bluck	4 17 1	The State of the S		Permp	Thermon		Cone	Slad	2	Anishibip
Chase		12 Sec	1 1	- Plent Fe		Wast Fuel	Ar		Kune	belect	3	With Jack !
Clark		2 Semi	2 2	24 % e er	1. 100	Force Fee 1	11 em o		Cinc	SIII	2	Amidinip
Clark	2 100	4 Block	4 5	- It to Thest Per		Pune Fee		H omb	Disc	Select	3	
Decatur	2.00	1 Sec.	111111	The Allegan Property			Pur		Disc	Select	1.1	Amidelsio:

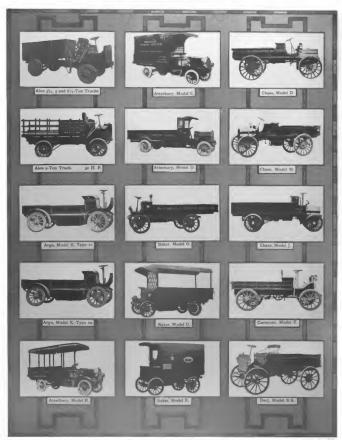
^{*}Trucar, # Pulls I jone in Trader . Two evile . Four Wheel Drive #1 Fourt Drive a To 240

OF TRUCK MANUFACTURERS FOR COMING SEASON.

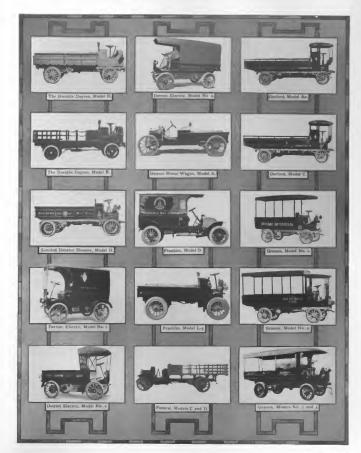
Standard Gasoline Commercial Vehicles.

	7	IRES		SPR	INGS		BRA	KES		ВО	DY					ا ا			
Final Derre	Front	Rear	Front Axle	Front	Rear	Steering	Emergency	Service	Frame	Length	Width	Overall Length	Overall Width	Wheelbase	Tread	Chassis Weight.	Maximum Speed	Sent Location	Lies Price.
						Н	alf-7	Γon	and Less										
li l	20x3 2xx2 2xx2	1482 1582 1282 5 1882 1282 5 1882 1882 1882 5	tubalar Forged Word D Forged Channel Spaare Square Tubular Spaare Tubular	Sem ell Hill Foll ell I ell I ell I ell Sem ell Sem ell Sem ell Foll ell Sem ell Sem ell Foll ell Sem ell Sem ell Foll ell Sem ell	Sem ell Remont Fall-ell Sem ell Fall-el	Pan Coan Coan Coan Coan Coan Coan Coan Co	Hubs Hubs Hubs Rever Trans Hubs	Hub Hubs Hubs Trans Kever Hubs Lap Hubs Hubs Hubs Hubs Hubs Hubs Hubs Hubs	Dressel Steel Tudular Steel AngleSteel AngleSteel AngleSteel AngleSteel AngleSteel AngleSteel Pressel Steel Pressel Steel Pressel Steel Pressel Steel Angle Steel Pressel Steel Angle Steel Pressel Steel Channel Steel Pressel Steel Channel Steel Pressel St	48 100 27 27 28 10 10 10 10 10 10 10 10 10 10 10 10 10	2n 3n	116. 125 101 121 126 125 142 146 146 110 168 130 168 130 168 130 168 130 168 130 168 130 168 168 168 168 168 168 168 168 168 168	64 60 64 60 60 60 60 60 60 60 60 60 60 60 60 60	72 9-7 28 84 119-1 75 86 87 119-1 100- 96 110- 90 124 1111 110- 90 84 90 84 90 84 110- 90 84 110- 90 84 110- 90 84 87 87 88 87 88 88 88 88 88 88 88 88 88	300 47 60 60 60 60 60 60 60 60 60 60 60 60 60	1 100 1 1 200 1 2 200 1 1 800 1 800	35 25 26 26 20 30 30 18 25 25 25 20 20 21 35 35 35 20 20 18 44 20 20 21 25 20 20 21 25 20 20 20 20 20 20 20 20 20 20 20 20 20	Above Behind Above Behind Above Behind Above Behind Above Behind	6 6 6 6 6 6 6 6 6 6
						ŀ	lalf-	Ton	to One	To	n.								
	16x2.	14 m 2	Square 1-beam 1-	Pull ell 1 e	Full-ell Semi ell (1) Semi ell (1) Semi ell (1) Semi ell (1) Platf (1) Platf (1) Platf (1) Semi ell (1) Platf (1) Semi ell	t Dan Gemmer W & S S & N Gemmer Gemme	Habs Hubs Hubs Rever J S Rever Gont	Trame Trame Trame Trame Trame Trame Hubs Hubs Hubs Trame Hubs Hubs Trame Hubs Trame Hubs Trame Hubs Trame Trame Trame Trame Trame Hubs Trame Tra	Annel Steel Annel Steel Annel Steel I Tressel	08 00 74 4 72 2 84 4 60 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	4 5 4 4 4 2 5 2 2 4 7 5 6 6 6 7 2 2 2 2 5 7 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	144 158 144 163 150 150 151 147 150 163 124 150 163 124 150 151 172 170 181 182 170 181 182 182 183 183 183 183 183 183 183 183 183 183	72 60 60 60 60 60 60 60 60 60 60 60 60 60	No. 100	\$6 \$5 \$5 \$5 \$5 \$5 \$5 \$5 \$5 \$5 \$5 \$5 \$5 \$5	1 also 1	10 1 1	Above Above Above Above Behmid Behmid Behmid Above Behmid	1.00

Illustrating Standard Models for 1912.



Illustrating Standard Models for 1912-Continued.



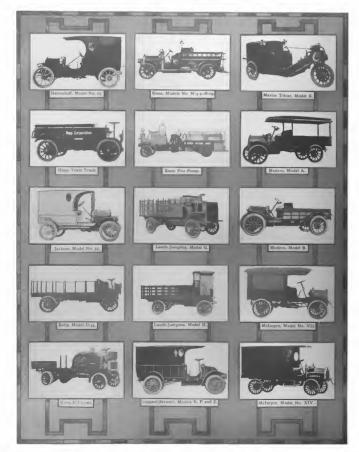
TRUCK February, 1912. **Tabulated Detailed Specifications of 1912**

	1					P	OWER PLA	NT		co	OLING		TR	LANS	MISSION
MAKE.	Load Capacity.	Cylinders.	How Cast	Bore	Stroke	Power	Carbutetion	Ignition	Lubrication	Circulation	Kadiator	Clutch	Form	Speeds	Location
minion Sere?	2.000	1	Block	1 1	8 4 5	113	Strien erg	Bon a	SHAFF	Therm	1 - 1-11	187.0	Select	1	W ₁₁ 1 = 1c 1:
nnklin riord M-C	2,000	1	Sr. Pairs	4 0	1 0	2 h		Horn and Lare	Tich II				Select Proct	1	Arrest
f-C bowaky	2 1100	1	Block Pairs	4.2	4 5	21	Fut Fee	la h	1a			1	Select Select	4	Was in his
mm t-Kraft field	2 1 110	1	Hock One's	4 2 1 0 4 1	1 2	MI	It will be	House	3 4				win i		An
field	2 1 100	1	Pairs	1 1	1 2	17	(Don't Free		- 15.			100	Ph. Inches		11 11 1-21
l ans elkar	2 1 10	1	Sep	4.5	4 7				a h		1		vin i	1 8	
bert b. Ingreent	2 1 1	2	Sep	1.0	100	11	**	R	in the				vele 1		Ar
emar bert h-Juergent e Giant ntyre	2 1 11	2 2	Sel-	5 2 8 5	1 0			-			-		lac	2 2	Ar Walland Back
k tag-Mason	1	1 4	Sep Patr Sep Sc			22	1		AFI		Arment	M.D.		1 2	Val la ka
itor itor	2 (0)	1 2	Sc Hlorik	1 2	()	24					1	100	heler t		that I want
er -P		2	10 = 2	3.1	1 4	2.4		Lagrand Carried				18.	10at	2	Ho lead
nouth sel	3	1	Distre	4 2	1 1	251	Faifu		TAFI		37	-	lari velecti velecti libari Selecti Francisco Lani Pon		
	11:	1 1	501		1 5	211	F of Fire		481	1		15.	f an	2 2	An A-
nidt ice	1 1	1	Sep Sep Flak	177	2	100	r r berg		1		Daniel .	U.S.	Fn. on	1	
ert		1	III -L	1 2	1 2	100	Ti It Fee	tom Stark tock follori				f ate	Select Forton	1	11 1 - 7 1
tor t	2 10	1	Pairs Pairs	8 4 8 2 3 7 4 0 5.2	1 2 2 1 5 0 0 1 2	18 8	rter Tat Fee Plat Fee	Belon	I A P P	Press			Pro-tion		An
-L or	2 00	8		4.0	4 0			House h	HAFP			12.	Select	5	With Motor
itman itesides	2	1 4	lock	3.7	. 1 2	10 1	Schebler Float Fee Marvel	The best	Sel A P P	Puer	H Tit lar Til lar	The same	Select Flan	200	On Front Am
con	2,000	1	lock Pairs Pairs	1 2	4 5	26 6	Henneri Schelder		F ise Fee	Pump Pump	Tubelar	Cont	Select Plan Select Prog	3	With Wither On Program Amilian Amilian Amilian
							One T	on to 1.5	Tons.						
ndon* -	2 100	13	70	4 3	15 5	122	Float Fee! Stromberg	Ik - ith	Fone Fee	Them:	In - or	N LAW	Select Plan Select Select	1 5	With Axlen
psé erican Eagle	2 51111	1	Pair	4 13	1 0	10 1	Stremberg			Therm	To mar	t ne	Select	2 2	Amiliship With Jacksh With Jacksh Amidship
erican Eagle near r	1 410	2	Sep Hita k	117	4 5 2 4 0			Bon I	Sol & F P	Pane	Tich-car	Plate	I'rog Select	3	Amidship
95	CHIE	13:	Sen	4 1	10		Schehler Ploat Pee I	10	Mith Foel Medianum Fine Fred Force Feed	Air Thomas Possi Possi	Ti sular	Cone	beles t	3	Amidship With lacksh
ttand atur	7 000	1	Sep Sep Ittes k	4 11	4 0	10 0	Schebler Rayfiel	tager He to He h Magnet	Pome Feed	Per	H1	h	Select 1 Ct Select Select	3 2	Amidship Amidship Amidship
emic ford	T 0000	1	Pairs	1 2	5 2	40 0	Optional Float Feel Float Feel	Box 6	Splach .		Tuhular II omb	Cone	Select.	4	Amidship With Motor
bowsky rt-Kraft	3 (1914)	1	Hock	4 1	5.2	10 0	les nepler	Magnet	Sil & Pan	Pump	Tubular	Disc	Select	1	Amulship
nson ntyre	1,19111	1	Parra		+ 5		Float Fee!	Cintinnal	opla h	Pump	H omb	Ciane	Select Select	1	Amidship
ntyre s	1 000	1	Block Block Pairs Pairs Pairs	11	5 2	100 5	Day Kald	Briggs Unemann Mea Jump Spark Mea	Sylach Sy	Thermo	Tubular	Eve	Plan	2 2	Amulship With Jacksh. Amidship With Jacksh. With Motor
er pson dusky	1 1990	1 2	Carre	4 0	5.0	24.0	Float Feel	Jump Spark	Spl. & F F	Thermo	Tubular Tubular Tubular	Disc Disc	Prog Plan Select	3	With Motor Amidship With Motor
dusky	1 000	1	Block Pairs	4 0 1 7 1 1	5 0 5 0 5 0 1 2	10 0	Stromberg Ploat Fee! Float Fee! Stromberg	Enemann		Pump	Tubular Tubular	Cone	Select Select	3	
mberg	1 1600	1 2	Pairs Sen	1 2	5 0	22 0	Float Peel Stromberg Float Peel Schebler	Atwit r-Kmi	Force Feed	Pump		Disc Cone Disc	Select I Cl	3	Amelship Amidship
siman ' t	1.000	1	Pairs Sen Pairs Pairs Pairs	1 2 1 2 1 2 1 2 1 2	4.5	10.0	Float Pecil Schebler Stromberg Stromberg Hennett	Eisemann Jamii Spark Atwit r-Kent Solutdorf K W Hosch	Splash Splas PF Splas PF Force Feed Spla Pump Splas PF Force Feed Splas PF Force Feed	Thermo C Pump Pump	H'comb H'comb Tubular	Conr	Select I Cl Select Select Select	3 3 3	Amidship Pront Axle Amidship
COX	100	- 4	Pairs	1 4 2	165	§ 50 C					Finimiar	l'one	Ebelect	1 3	LAmidshin
	1 4 20			Lin	1 : 7	I et a		ons to T	0.1.1	Pomp	Coboler	Cone	[Select	1 3	[Amidship
erican o as	1 30	11	Pairs Pairs Pairs	4 3	1	6	Float Fee! Float Fee! Ploat Fee!	Harch	Force Fee! With Fue! Force Fee! Spl. & F. P. Force Fee! Furce Fee!	Pump	Tubular Tubular H comb	Disc Plate Plate	Select	3	Amidship With Motor
	4 90	H	Block	1 2	4 5		Schebler	Jump Spark Bosch	Force Peed	L'umm		Plate	Select	3	With Motor Amidship
ry ver	1 116	2	Sep Sep	5 5	5 0	28 0	Breeze	Jump Spark Bosch Batters	Force Pee-I	Pomp Themm Pomp	H comb	Plate	Select	3	Anudship With Motor
lt ord	3 (00)	1	Sep Pairs	8 5	5.5	15 0	Breeze Float Fee! Float Fee! Kingston Hilley	Bosch Bosch	Porce Peed	Pump Pump Pump	H comb	Disc	Select Select Select	3	Amidship With Motor With Jacksh
s se Dion	1,000	1 1	Sep Seil Pair- Pair-	8 5 8 2 8 5 5 1	5 0	101	H. Rev	Bosch. Bosch	With Puel	Air Pursi-	Tubular	Cone	Select	4	With Jacksh
able Dayton	1 10	1	Patr.		8.2	14 0	Str nhetg	Jun Spark	Pan p	Panp	Totolar		Select Select	3	Amulship
able Dayton ford	1, 10	1 4	Hilaria	1 2 1 0	6 11	25	Own Steinherte Own Shelder	Lamp Stari	Sel & F F	Panip	- dedar	Disc	Fru tum Select	7	Amulship With Jacksh.
her	3,110	1	Pairs	1 2	8 2	24 1	Scheller Scheller Flat Pre Rottel Scholler Jalder	Booch Lamp wasi Kross	Sel & P F	Pump	thular H on b adular T dular H cond Tobular	Cone	Select Select Select	1	With Motor
mm t-Kraft	4 . 11	1	Part-	1 2	1 5 3	12	R offel	true E	Schulb Schulb Part	Pomp C Pomp	Tubular	Disc.	Select	1	Americking Americking Americking
witt	1.00	2	Paire	1 1 2	15 11	24			Fig. c Fee	Therms	H cond	Corr This	Select Plan Select Select	1	
o iy sel-Kar		1	-01	1 2 1 1 1 5	1:	1	1 K	11 - 1	With Fuel Pince Peerl Pan p Porce Peerl Self & P F Fince Peerl Self & P F Schahl Self & P F Schahl Self & P F Schahl Self & P F	Ass		1 time		É	Amulsh p
	100	1	70		1	2 1			For = Free	Pieri		Cone	Select	1	Walls Mater
nbert ill-Juergens intyre		1	Pair Pair P	1 3 3	3 11	10			SAFF	Posse Posse (herea)			Priction Select Select	11	With lacksh
		1 1	1 1	1	1 2				ALE			11/ce 14/ 11/30	Select	1	With la ksh
rgan :kard		1 2	P = 1	3 2		2 2		A II	1 1 1 1	1 1			Fris	1	With lacksh
ckers nhard			15						ALE SEP SEP SEP				From Sele-1 Prog Front m	1 1	With lacksh With Corr With lacksh With lacksh With lacksh Arthup Arch
rr gemer		1	1										-1c+ 11		Ar h
etuperg				123								11 -	li (Din)	62	10-by 6-0

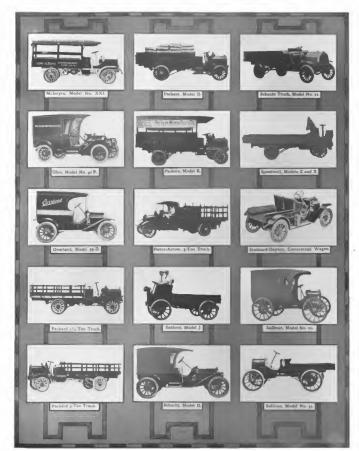
2.760 2.600 1.600 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000

	TII	RES		SPR	INGS		BRA	KES		во	DY					athr.		#	
	Front	Reaf	Front Azie	Froat	Rear	Steering	Emergency	Service	Frame	Length	Width	Overall Length	Overall Width	Wheelbase	Tread	Chassis Weight	Maximum Speed	Seat Location	List Price.
to the state of th	を送信 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Mox 8 5 (co.	I-beam I beam Tubular I beam I	sem ell sem ell ell el	Sers ell sem ell Platf Platf Platf Pilott Platf Platf Platf Platf Platf Platf Platf Platf Pilott Platf Pilott Platf Pilott Platf Pilott Platf Pilott Platf Pilott Platf	Genmer Gentler W & N Conner Gentler Ge	Holia	1 S S S I I lubs I S S I S S Hubs Hubs I S S S I S S Hubs Hubs I S S S S S S S S S S S S S S S S S S	Presend Steel Wood Drawn I have been with the presend Steel (Channel Steel Channel Steel Presend Steel Channel Ste	104 99 90 120 105 111 80 111 80 112 90 12 13 90 81 110 90 81 90 80 80 80 80 80 80 80 80 80 80 80 80 80	01 00 00 00 00 00 00 00 00 00 00 00 00 0	18 16 16 16 16 16 16 16 16 16 16 16 16 16	08 21 27 76 68 68 68 68 68 68 68 68 68 68 68 68 68	110 110 94 125 126 1121 1106 113 1106 113 120 113 113 113 113 113 113 113 113 113 11	50 50 50 50 50 50 50 50 50 50 50 50 50 5	1 700 1 100 2 100 1 600 1 600 1 600 2 800 2 100 2 100	25 15 20 14 25 15 15 16 18 18 18 18 18 19 10 18	Behind Behind Above Above Behind Above Behind Above Behind Above Above Bichard Behind	\$2,850 2,100 2,500 2,000 1,200 1,200 1,200 2,250 1,600 1,100 2,250 1,100 2,500 1,100 1,500 2,500 1,100 1,500 1,100 1,500
14.		start 6	Fubular	Full ell Full ell Full ell Full ell Sem ell	Fall ell Fall ell Platf	Worm	One	Tor	Channel Steel to 1.5 T Angle Steel Wood & Steel Channel Steel	on	_	201		11.18	100	2,100		Beliant Above Beliant Above Above Beliant	2,100 2,000
1 51 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		14m 5 15m 5 1 14m 1 5	Spiare Spiare Tubular I beam Spiare Tubular I beam Rest I beam Tubular I beam I beam I beam Rest I beam I beam I beam	Semi ell Full ell Full ell Semi ell Sem	Platf. Platf. Platf. Platf. Platf. Platf. Semi ell. Platf. Semi ell. Platf. Semi ell. Semi ell. Semi ell. Platf. Semi ell.	Ross Own Own Gemmer Harmes W & S Ross Own Own W & N W & N G & S Own Dan Dan Dan Dan Dan Dan Dan	Hale Hale Units Lever Hale Hale Hale Hale	LS LS Labs Labs Hubs LS Hubs LS Hubs LS	Unannel Steel Presse Steel A Was La Steel Presse Steel A Was Land Land Land Land Land Land Land Land	10% 114 112 112 112 112 113 114 114 114 120 114 114 120 114 114 114 114 114 114 114 114 114 11	_	189 (1) 180 180 180 180 181 181 181 180 180 180	61 20 22 64 67 66 67 72 64 67 72	10% 115 417 114 112 122 122 121 120 121 124 66 419 116 106 115 120 106 115 121 121 116 117	ものは、100gののののである。 ものは、100gのののののは、100gのののである。 ものののののののののである。 ものののののののののである。 ものは、100gのののである。 ものは、100gのののである。 ものは、100gのののである。 ものは、100gのののである。 ものは、100gののののである。 ものは、100gののののである。 ものは、100gののののである。 ものは、100gのののののである。 ものは、100gのののののである。 ものは、100gのののののである。 ものは、100gのののののである。 ものは、100gのののののである。 ものは、100gのののののである。 ものは、100gののののである。 ものは、100gのののである。 ものは、100gののでな。 ものは、100gののでな。 ものは、100gののでな。 ものは、100gのので。 ものは、100gのので。 ものは、100gのので。 ものは、100g	1 test 1 total 1 test 2 and 1 test 1 test 1 test 1 test 1 test 1 test 2 and 1 test 1 test 2 test 3 total 4 visi 4 visi 1 test 1 test 1 test 1 test 4 test 4 test	15 20 20 15 15 15 15 14 15 14 15 14 15 14 15 15 14 15 15 15 14 15 15 16 16 16 16 16 16 16 16 16 16 16 16 16	Allower Richard Above Stabe Hichard Above Allower Woose Hichard Above Allower Hichard Above Behard Hichard Above Behard Front Sale	1,000 923 2,500 2,400 2,264 2,100 1,600 2,200 2,400 2,400 2,400 2,400 2,400 2,500 2,
100	-1.	Stru-5		E I	A	IRin	1.5	Ton	s to Two	o T	on	S.			io S		13	Illehand	
1 34 30 10 10 10 10 10 10 10 10 10 10 10 10 10	東京 () () () () () () () () () (100.1 5 1 10.1 1 10.1 1 10.1 1 1 1	Libram Li	complete seminal semin	Sensi ell Sensi ell Sensi ell Sensi ell Platí Platí Platí Sensi ell Sens	Count Cheminer Count Cheminer Count Ross Ross Barnes Count Rens Ross Rons Ross Rons Ross Ross Ross Ro	Hubs Trans Hubs Hubs Hubs Hubs Hubs Hubs Hubs Hub	Hubs Hubs Hubs Hubs Hubs Hubs Hubs Hubs	Wood & Steet L. bannel Steet Channel Steet	12 12 12 12 12 12 12 12 12 12 12 12 12 1	51 60 52 52 53 53 54 54 51 51 51 51 51 51 51 51 51 51 51 51 51	201 117 210 168 1166 1166 1190 201 180 1191 1192 228 199 1192 228 1192	62 12 66 62 75 75 75 75 75 75 75 75 75 75 75 75 75	1 2 144 144 149 149 149 149 149 149 149 149	108 52 52 56 55 56 56 56 56 56 56 56 56 56 56 56	1, Snp 3, 200 3, 300 4, 300 2, 500 4, 300 4,	18 20 10 12 13 13 13 14 16 16 16 16 17 20 18 16 16 17 18 16 17 18 18 18 18 18 18 18 18 18 18 18 18 18	Illehand Above Illehand Shehand Above Abov	3. msp 2. 7500 2. 8000 2. 6500 1. 5000 2. 2150 2. 2150 2. 2150 2. 2150 2. 2150 2. 2150 2. 2500 2. 2150

Illustrating Standard Models for 1912-Continued.



Illustrating Standard Models for 1912-Continued.



POWER PLANT

TRANSMISSION

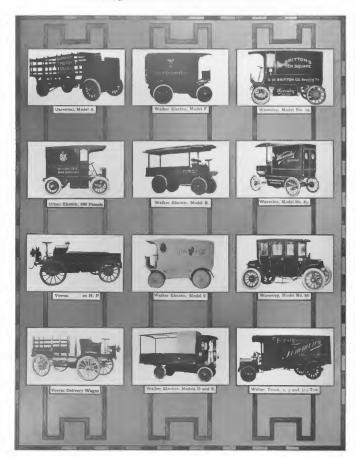
Tabulated Detailed Specifications of 1912

COOLING

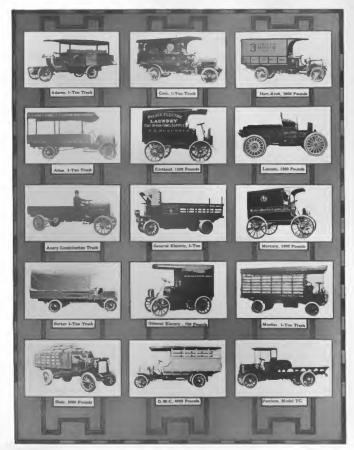
MAKE	Load Capacity.	Cylinders. How Cast	Bore	Stroke	Carburation	Laition	Lubrication	Circulation	Radiator	Clutch	Form	Speeds	Lecation
F & S Fictor Walter		4 Sep 4 Sep 4 Pairs	4 7 5 4 3 5 4 0 6	0 to 1 2 \$11 1 0 to 1	S hebler Schebler Stromberg	Eisemann Hosch Hosch	Sid & P P Sid & P P Force Peed	Pomp Pomp	Vertical II cmb	one that	Select Select Select	3 1	Annah ta
				T	wo To	ns to T	hree To	ons.					
illar Kraft iden Kraft	. 000 . 000	4 Pairs 4 Pairs 4 Pairs 5 Pairs 5 Pairs 6 Pairs 6 Pairs 6 Pairs 7 Pairs 7 Pairs 7 Pairs 7 Pairs 8 Pairs 8 Pairs 8 Pairs 8 Pairs 9 Pair	5 5 5 5 5 6 6 7 5 5 6 6 6 7 5 5 6 6 6 7 5 5 6 6 6 7 5 5 6 6 6 7 5 5 6 6 6 7 5 5 6 6 6 7 5 6 6 7 5 6 6 7 5 6 6 7 5 6 6 7 5 6 6 7 5 6 6 7 5 6 6 7 5 6 6 7 5 6	5 35 55 65 65 65 65 65	is hebler I Schebler I Kas Hed. Schebler I Kas Hed. Schebler Histar Feed Float Feed Float Feed Float Feed Float Feed Float Feed Stromberg Float Feed Stromberg Float Feed Stromberg O Stromberg Schebler	Hosels Line Stark Exercised St	Pierce Perinal & Pierce	C Purm Pump Pump Pump Pump Pump Pump Pump Pum	H comb H comb H comb Tubular Tubular H comb Vertical, H comb Vertical, H comb Tubular	Cone Disc Disc Disc Disc Disc Disc Disc Disc	Solect I Sol		Amelden Amelde
					Thre	e Tons	to Four	Tons.					
Aico G. MC. Relisace Kaickerbocker Packers. Walter Commer Commer Keton Keton Seaurer Speed well Stegeman Sternberg	7,000 7,000 7,000 7,000 7,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000 8,000	4 Pairs 4 sep 4 Sep 4 Sep 4 Pairs 4 Pairs 5 Pairs 7 Pairs 9 Pairs 9 Pairs 9 Pairs 9 Pairs 9 Pairs	5.0 5.5 4.5 5.2 4.0 4.3 4.5 5.0 4.3 5.0 4.5 5.0 4.5 5.2 8.5 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0	5.0 30 5 5 30 5 5 45 4.7 t0 5.5 30 5.5 30	0 Ploat Peed 0 Schebler 0 Optional 0 Ploat Peed 0 Stromberg 0 Own 0 Stromberg Own 0 Schebler 0 Schebler	Bosch Mea Bosch Splitdorf Bosch Bosch Bosch Bosch Bosch Eisernann Optional	Spl & F. F. Splash. Splash. Splash. Splash Pump Porce Peed Splash. Porce Peed Peed Peed Peed Peed Peed Peed Pe	C Pump Pump C Pump C Pump C Pump C Pump Themio	Tubular Tubular H comb Tubular Tubular Tubular Tubular Tubular H comb	Exp Cone Cone Plate Cone Cone Cone Cone	Select Prox Select	3 3 3 3 3 3 4 4 3 . 3	Amedship With Jacksh Amedship With Jacksh With Jacksh Amedship With Jacksh Amedship Amedship Amedship Amedship
						Tons to							
Alco Barker Barker Barker Gargenau Gargenau Gargenau Gardord Garder He witt Johnson Knickerbocker Knox Knox Mark Mark Mark Mark Mark Mark Mark Mark	10,000 10	Pairs Sep Parrs Sep Parrs Parrs Block Pairs	4 7 4 2 0 4 7 7 7 5 5 2 0 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5 5 6 0 40 6 5 5 5 6 0 40 6 5 5 5 6 6 0 40 6 5 6 5 5 0 40 6 6 5 6 5 6 5 0 40 6 6 5 0 40 6 6 5 0 40 6 6 5 0 40 6 6 5 0 40 6 6 5 0 40 6 6 5 0 40 6 6 5 0 40 6 6 5 0 40 6 6 5 0 40 6 6 5 0 40 6 6 5 0 40 6 6 6 5 0 40 6 6 6 5 0 40 6 6 6 5 0 40 6 6 6 5 0 40 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	0 Newcomb 0 Ploat Peed 0 Mayer 0 Own 0 Float Peed 0 Schebler 1 Float Peed 0 Schebler 1 Float Peed 0 Schebler 0 Own 0 Float Peed 0 Schebler 1 Float Peed 0 Schebler 1 Float Peed 0 Own 0 Stromberg 0 Optional 0 Stromberg 0 Optional 0 Stromberg 1 Chromosal 1 Stromberg 1 Special 1 Special 1 Chrom 1	Bosch	Spl & P. P. Splash Sidash Sidash Sidash Sidash Sidash P. P. Spl & P. P. Spl & P. P. Spl & P. P. Splash Splash Porce Peel Spl & P. P. Splash Sp	C Pump Pump Pump Pump Pump Pump Pump Pump	Hacente	Plate	Select Plan Select Select Select Select Select Plan Select Plan Select	***************************************	Amidship, Amidship, With Jackship, Amidship,

	1	TIRES		SPR	INGS		BR	KE8		во	DY					2		,	
Final Drive	Front	Rear	Front Axle	Front	Rear	Steering	Emergency	Service	Frame	Length	Width	Oversil Length	Overall Width	Wheelhase	Tread	Chassis Weight	Maximum Speed	Seat Location	Lise Price
	12x4 3fox4 16x3	lons or o	I-beam I-beam . Square	Semi-ell Semi-ell	Platf Semi-ell. Platf.	Ross . Worm .	Hubs Hubs Hubs	I.S. S. Hubs.	Channel Steel, Channel Steel Channel Steel	138	51			125 140 124	62 66 58	3,500	12	Above Behrnd.	2,900
						Tw	o T	ons	to Thre	e 7	or	15.							
は、	14x4 16x5, 36x5, 34x5, 34x4	1 1 1 1 1 1 1 1 1 1	Round 1 1-eam 1 1-eam 2 1 1-eam 2 1 1-eam 2 1 1-eam Rest 1 1-eam 1 1-e	Semi ell Sem	Figure 1 of the series of the	W & N W & N Chan Chan Chan Chan Chan Chan Chan Chan	Holes	AS A STATE OF THE	Lamnel Steel Channel Steel	11% 120 144 144 168 162 164 164 164 164 164 164 164 164 164 164	52 72 72 72 72 66 66 66 72 72 72 72	144 216 217 227 227 227 227 237 240 107 217 227 237 237 237 237 237 237 237 237 23	82 81 7A 72 79	114 140 129 124 127 134 151 110 126 146 124 150 135 148 148 148	56 63 30 62 61 68 56 70 64 78 62 64 58 60 67 56 67 56 62 64 58 60 62 64 58 60 60 60 60 60 60 60 60 60 60 60 60 60	\$ 2,000 \$ 3,000 \$ 5,00	14 12 14 110 11 15 15 15 15 15 15 15 12 20 12 12 12 14 18 12 12 12 12 12 12 12 12 12 12 12 12 12	The ford Stelling Ste	3 240 3 200 3 200 4 200 5 200 6
3	136x5.	36x1 5 I	Square	Semi-ell	Plati Plati				to Four				83 76 72	120	60	5,400	12	SileAhove	3,60 0 4,000
5 .	36x5.	136x4[I beam	Semi-ell Semi-ell	Semi-ell		Hote	13 8	H hannel Steel	170		211 220 192	RO 84 72	126	6.8 n.5	\$,500	12	Ahove	1,500
78 - 78 - 78 - 78 - 79 - 79 - 79 - 79 -	56x5 36x5 36x5 36x5 54x4 36x5 16x6, 36x5 16x5 16x5 36x5	36x4 I 36x5 I 42x5 I 754x4 7 I 36x4 I 36x6 I 42x5 I	Round Lleam Lleam Lleam Lleam Square Lbeam	Semi ell Semi ell Semi ell Semi ell Semi ell Semi ell Semi ell Semi ell Semi ell	Semi-ell Semi ell Semi ell Semi-ell Platf Semi ell Semi ell Semi ell Semi ell Semi ell	nas.	Hubs Hubs Hubs Hubs Extr Hubs J S J S	Hulm.	Channel Steel. Woul & Steel.	144 144 150 150 147 168	66 72 78	240 240 236 224 216	73	116 150 154 132 144 149 151 153 115 155	60 62 62 62 62 69 64 64	\$,500 6 ,500 5 ,200 6 ,000 4 ,800 5 ,100 7 ,000 6 ,900 5 ,500 6 ,000 7 ,500 6 ,000 7 ,500 6 ,000 7 ,500	12 12 12 13 13 13	Above Above Above Behind Above Behind Above Behind Behind Above Above	3,500 3,400 5,500 4,900 5,000 3,500 1,950 4,500
								Ton	s to Five		ons								
he h	36x6. 36x7. 30x4. 30x4. 30x6. 30x7. 30x6. 30	40x6 1 40x6 1 30x6 1 30x5 1 40x6 1 40x6 1 40x6 1 40x1 1	D Forged beam	Semi ell Semi ell Sem	benn eil (Pati sem eil Sem e	Kon Kon Con Con Con Con Con Con Con Con Con C	High	Shaft SSSSSIUS SSSSIUS	Mannel Steel, Wasel & Steel, Channel Steel Channel Steel Sizel Steel Sizel Steel Channel Steel Chann	108 150 144 108 144 170 150 150 151 108 151 108 152 108 158	68 64 60 80 80 82 72 72 72	235 228 228 228 204 204 204 204 204 204 204 222 222 222	72	160 162 118 146 130 130 130 149 149 122 149	62 64 67 60 72 72 71 70 70 70 70 70 70	7, MOI 5, Gali, 6, Sell, 6, Sell, 6, Sell, 7, Sell, 9, Sell, 9, Sell, 9, Sell, 9, Sell, 9, Sell, 9, Sell, 1, Se	10 9 1 10 12 10 10 14 12 12 12 13 10 10 10 11 10 11 10 11	Abuse Abuse Behind Behind Behind Behind Abuse Bubind Abuse Abuse Bubind Abuse Abuse Bubind Abuse Abuse Bubind Abuse Abuse Abuse Abuse Bubind Abuse Abuse Bubind Abuse Bubind Abuse Bubind Abuse Bubind Abuse Bubind Abuse Bubind Bubin	4 210 4 510 5 700 6 600 6 1210 6 1210 6 1210 6 1210 1 210 1 210 8 110 4 110 4 110 4 110 4 110 4 110 4 110 6 110

Illustrating Standard Models for 1912-Continued.



Illustrating Standard Models for 1912-Continued.



Tabulated Detailed Specifications of 1912

						PC	OWER PLANT		abulate		LING	Speci	1		115510N
	Load Capacity.	Cylinders.	How Cast	Bore	Stroke	Power	Carburetion	Lgnition	Lubrication	Circulation	Radiator	Clutch	Form	Speeds	Location
Stearns	10,000 10,000 10,000	4 4	Sep	5.2	6.0	60.0	Ploat Feed Schebler Stromberg	Bouch	Porce Feed Spl. & F. F. Mechanical	Pump	H'comb. H'comb. H'comb.	Disc	Select Select Select .	4 3 3	Amidship With Jack h

Over Five Tons.

	11,000	4	Pairs	4.7	15.5 HO.0 Own	(Bosch .	Pump	Pump	Tubular	Cone	[Cl	3or4	Amidship
B-O-E	12,000	4	Pairs.	5.4	8.0 44 1 Float Feed	Splitdorf	Spl. & P P	Thermo		Disc	Select	3	Amidship
Gaggenau	12,000	4	Pairs	5.3	5.9 45 0 Float Feed	Bosch .	Spl & F. F.	Pump .		Disc	Select .	4	Amidship
Knox	12,000	4	Sep	5.5	5.5 48.0 Stromberg	Bosch	Force Feed	L' Pump		Plate .	Select .	3	With Jacksh.
Speedwell	12,000	14	Pairs.	5.0	5.0 40.0 Schebler .	Essemann	Porce Peed			Cone	Select	3	Amidship
Stegeman.	12,000	14	Pairs.	5.0		Bruggs	Spl & F F			Disc	Select	4	With Motor
Alco	13,000	4	Pairs.	5 0	6.0 40.0 Newcomb	Bosch .	Sol & F F	C Pump		Disc	Select.	3	Amidship
Commer	13,000	4	Pairs	4.7	5.5 40 0 Own .	Bosch	Pump	Pump	Tubular	Cone	I CI		Amidship
Aries	14,000	4	Paire.	5.0	5 7 40 OG & A	Bosch .	Pump			Disc .	Select .		Amidship
Hewitt	14,000	4	Pairs	4.2	6.0 40.0 Own	Bosch .	Splash	Pump		Cone .	Plan	2	Amidship
Victor	14,000	4	Sep	5.0		Bosch	Sol & P. P.			Opt	Select	1 3	
Remington	15,000	4	Pairs	4.8	6.0 38.0 Ploat Feed	Optional.	Force Feed		ll'comb.		Hydr	1	Amidship
Hawitt	20,000	4	Pairs	4.2	6.0 40.0 Own.	Bosch	Solash	Pump			Plan	2	Amidahip
Moore	20,000	4	Pairs.	5 0		Bosch	Sol & F. P	C.Pump	Il'comb.	M.Disc .	Select		Amidship
Remington	20,000	4	Pairs.	4.8	6.0 38 0 Float Feed	Optional	Force Feed	Pump	H'comb.		Hydr		Amidship

Municipal Wagons, Etc.

	-			_								_	
Beck 18 Passenger	14	[Sep	4 5	15 5	140 0 Schebler	(Rems	#htslash	F'amp	iTubular	IPlate	[Select]	3	With Motor
Franklin 5 Passenger	14	Sep	4.0	4 0	18 0 Float Feed.	Busch	SH & F. F	Air		Disc	Select	3	Amidship .
Great Eagle Ambulance	14	Sep	4.7	5 0	50 0 Stromberg	Remy	G P	Pump	H'comb	Cone	Select	3	Amidship.
Great Eagle Ambulance	10	Sep	4.2	5.1	no distrombera	Remy	G P	Ponts	H'comb	Cone	Select	3	Ami-Iship
Knoz Combination Hose	16	Sep	5.0	5 5	60 0 Stromberg .	Hotels	Force Feed	Pump	Tubular	Flate	Select	3	With Jacksh
Knox Chemical-Hose	14	Sep	5.5	5 5	48 0 Stromberg -	Bosch.	P P & Pums	K. Pump	Tubular	Plate	Select.	3	With Jacksh
Luitwieler Pump	14	Pairs.	6.0	6 5	60 @ Schebler	Dual	Force Feed			Cone	Select.	3	Amidship
Victor 15 Passenger	14		4.0	4 5	30 0 .	Bosch	Sol & P. F	E Pump	H comb	Dist	Select.	3	With Motor
Victor 20 Pana ger	14	Sep .	4.1	5 2	40 0	Bosch	Spl & F P	Fi Pump	H'comb	This	Select.	3	
Victor 24 Passenge:	14	Sep	4.8	5 5	50 0	Busch	Sol. & P P	6 Pump	H comb	Opt	Select	3	
Victor 30 Passenger	14	Sep	4.8	\$ 5	50 0	Bros h	Sol. & P. F	G Pump	Ill'comh	Opt.	Select	3	

Mixed Systems Gasoline-Electric

				-	,				
Couple-Gear . 10,000 Great Western 20,000	6	Sep . 5 2 5 5 5	5 5 45 0	stromberg Is	ou h Spl &	PF	Pump Tubulat G Pump H cumb 25KW	Elec	

Tabulated Detailed Specifications of 1912

	lty.	BODY				Ca P.			
MAKE.	Load Capacity	Length	Weight	Battery	Battery Wt.	Ainp. Hours Co	Motor	Motor Speed	Controller
Commercial Urbao General Vahicle Studebaker Ward Arso	500 600 200 800 800 1,000	\$6 4 83 3	6	30 LD 11 P1 14 GV 9 P1 Optional 42 25 Ex 11 Pi	835	104	GE-1.025 60 V 12 Amp 1020 85 V 16 Amp Spec. Auto Type Westinghouse	1.600	GE S 103. S-35-B Under Front Seat
Baker Commercial General Vahicle Detroit Urban Beater	1.000 1.000 1.000 1.000 1.000	80 4 72 4 75 4 73 4 87 4	2,200 1 2,950 2 2,660	42 Ex 9 Pl 44 11 Pl 60 Edis A-4 50 Edis A4 60 Edis A6	1.255	138	2 5 Honepower Service 1020-85 V 20 Amp Type 17 70 V 30 Amp GE-1025-60 V 32 Amp	2,000	S-35-B 14T GES 103
Studebaker Argo . Baker . Commercial Detroit	1,500 2,000 2,000 2,000 2,000 2,000	83 3 100 4 90 4	2 3.400 2 3.000 8 3.400	Optional 28 Ex 13 Pl 42 Ex 9 Pl 60 Eds. Ao			One GE Westinghouse 3.5 Horsepower Service Type 17-70 V 30 Amp.	1,300	id
annden Waverley Studebaker Waverley Detroit	2,000 2,000 2,000 2,500 2,500 3,000	84 4 115 4 156 5 100 5	3,750 0 3 4 4 4.840	44 13 Pl Editon 42 Ex 11 Pl Optional . 42 Opt 11 Pl 60 Edis All	1,485	162	1026-85 V 28 Amp GE 2 GE Type 18 70 V 48 Amp	1, 200	GE
aosden Valker** Saker Commercial Seneral Vehicle	3,000 3,000 4,000 4,000 4,000 4,000	96 4 150 6 132 5 132 5	6 4,500 0 6,500 6 6,300	Edison 42 Ex 11 Pl 42 Ex 11 Pl 42 Ld 00 Edis 44 GV 17 Pl Edison	1,600		One 3.5 Horsepower 80 V 4 Horsepower Service 85 V 22 Amp 1026-85 V 28 Amp	1,200	Cont. Tor S-35-B
itudebaker .ansden .ansden Waverley imericao	4,000 5,000 6,000 6,000 7,000	156 5 150 5 150 6	5.200 5,200 4 0 7 500	Optional Edison Edison 42 Opt 15 Pl	1,600		One GE 3 Westinghouse		GB.
ommercial ieoeral Vehicle tudebaker commercial** ouple-Grar**	7,000 7,000 7,000 10,000 10,000	156 5 154 6 157 5 192 6 180 6	9,500 8 10,000 9,000	62 Ld 60 Eds 44 GV 21 Pl Optional 52 Ld 60 Eds 44 Ld 21 Pl 44 GV 25 Pl	2,410	275	85 V 16 Amp 1 022 85 V 40 Amp 85 V 16 Amp One in each wheel 1 022 85 V 40 Amp	1,200	Cont Tor 4 S-35-B Cont Tor

Standard Gasoline Commercial Vehicles.—(Cont.)

	1	TIRES		SPR	INGS		BR	AKES		во	DY					ž.		· ·	
Final Drive	Pront	Rear	Front Aute	Front	Rear	Steering	Emergency	Service	Frame	Length	Width	Overall Length	Overall Width	Wheelbase	Tread	Chassis Well	Maximum Speed	Seat Local	List Price.
Chs Chs	34x5.		1-beam 1-beam	Semi-ell Semi-ell	Semt-ell.	Worm .	Hubs Hubs	I S Hubs	Pressed Steel Channel Steel Channel Steel	144	72 72		84	148 146 154	63.5 70 62	5,000	1111	Behind Behind	\$5,800 4,500

Over Five Tons.

	134x5 \$140x5 \$.111Round		I semi ell				it hannel Steel I									
Ch.	toxo doxo Divinare	Sami all	Semi ell	2 4 5	Hickory	1 %	Channel Steel	165	601 2	26 84	154	68			Stife	6,000
Cha	1354 7 1785 5. DIN St	Name all	Semi ell	Own	Market	1 5	Ch Nick St.	168	7.1 2	52 76	128	6.6	7 600	12 5	Behind.	6,000
	litar 12x7. Dl beam	Sermi est	Semi ell	Crwss .	11	1 2	Channel Steel	100	84		149	7.4	6 N/10	11	Sule	5.000
Che															Aluxe	4.500
1719	Strat 5 trat 5. DID Forged						Channel Steel									
t'h.	text text DiPorced	Semi ell	Servi ell	W & C	16-stee	1631 450	Channel Steel	0.50	72	100	1150	68	\$ 600		Behind .	4,000
Chi	lea: 142mm DForged	Same off	Semi-ell	Chara	Hults	1 5	Channel Steel	168	. 2	35 40	14.4		B. frul	9	Above .	5,200
							Channel Steel					70	6 NIG		Beland .	6.500
1714			Semi ell.													
4 h	long to take St NSt Sal.	Semi ell	Semt ell	4 Pm m	Habs	1.8	d hannel Steel .	1	. 2	30	156	70	0,970		Helimd	6,000
t b.	Was D town . Dil beam	Semi ell	bems ell	I barn	11 ales	l's	Preved Steel	180	84 2	40 85	138	68	9,600	- 8	bile	\$,500
Chy	16x7. 42x6 Dil beam				Hubs	1.5	Channel Steel	144	72		146					5,500
615	tigs Uass. DI beam						Prevel Steel	1		46 65	1167	61		10	Above	5 500
															Side	6,000
	1/25 D 14x7 D1 beam						Pressel Steel									
Chi			Semi ell	Henry	History	1.8	Channel Steel								Above.	
475			Semi ell	1.3	11.3	Dinte.	Pressel Steel	1	1 1 1	46 65	11102	61		8	Above	6.000

Municipal Wagons, Etc.

Clin	1 19. 1	Nox4	Square	(Semi ell.	Platf	Russ	1		[Channel Steel	120	72	192		130	50		20	Behind	3,000
Shaft	Silv A .	tox 4	Tubular .	Full-ell	Full-ell	Onn	Hobs	Teams	Wenni					122	5.3 9	2,000	30	Behind	
Shaff	1034 5	16x4 5	I beam				Hobs	Hubs	Pressel Steel	90	4.8		Contract land	133.1	50			Behind	3,500
Shaft	16×4 5	trat 5.	I beam .				Hubs	Hubs	Pressel Steel	90	4.8			1.58	50	:		Behind	4.250
Chs.	4095	40x5 12															30	Above .	9,000
1775	detail .	411% 5. S 13	I beam	Semi ell	Senn ell	Chan .	Hubs	J S	Channel Strel	101	50			145	(4)	0.00	30	Behmd	9 (00)
Chs	*4	85	D Forgel	Semi ell	Platf	Chan .			Channel Steel			123	40	110	5.81			Above	2.750
	14%4	14x4	D Forge!	Semi ell	Semi ell	11000	Habs	18	Channel Steel										2.740
	trat .	16 x t, 13	I beam	Semi ell	Semi ell		Habs	18	Channel Steel	111.		100			66		1		3.300
	17.84	tract D	Heam .	Sernt-ell	Serni ell	and the same	Hubs	IS.	Channel steel					140				i .	4.003
	17/16 4	Sext 5.1	i beam	Semi ell	Semi ell	ALC: UNKNOWN	Hubs	15	Channel Steel	1		1		140	- 64				1 4,000

Mixed Systems, Gasoline-Electric.

Electrical Description of the Line of the												
the tart? tart? There Semiell Semiell Hist. Wh. I have 2 to 102 65 172 22 14 note 6 Above /	I le	text fritari. D	Scott rill	Seune Oak	110 11	he Channel Steel	1 14 6 2	2 222	26 144	66 9.14	12 Atune	5,600
	1 h-	tax 12 tax 12 . 1 ha	ani armi ell	Seem ell	11-1, 33%	. I beam	2. 4 4	0. 1117	65 112	77 14 0000	a Above	

Standard Electric Commercial Vehicles.

						A)	CLES	TI	RES	BRA	KES	SPF	RINGS		
Contr. Spends	Wheelbare	Tread	Max, Speed	Mileage	Final Drive	Front	Rear	Front	Rear	Emergency	Service	Frent	Rear	Frame	List Price
Pad 2 Res	8.5		15		Worm.			16x2 5	1042 5	Ele.	Hubs	i ell	Semi-ell		11,600
Ful 2 Rev	2.5	56	13	50 45	Chs	I beam	1-beam	3412 5		2 prs		Semi ell	Semi-ell Semi-ell	Spl Des Channel Steel	1.800
Est 1 S Dec	84	59	11 3	. "	Che			11cm2.1	112x2 5	Hubs	1	Platf	Pullell		
			12	.40	Cha	Tubular	Tubular	5012.	11-2	Hubs			Platf	Wood .	
	86	54	12	511	Shaft	Tubular I-beam	Tubular . Porged	3623	3423	E.R.D1		Semi ell	Semi ell.	Channel Steel	1.800
Fu 1 2 Res	90	20	15		Worm	1-peam	Porgett	Son2	16x1	Elec	Hubs	I-ell	Semi-ell	Literator press	2,000
Part 2 Key	81.5	55	12	4.5	Cha	1		Jon2 1	long !	Exp		Semi ell	Semi ell	Pressed Steel	100
Pw.1. 3 Rev	80	5.6	14	55	Chs	1 beam	Rect	32x2 3		Hubs	JS	Semi-ell	Semi-ell	1	1,300
Paul 3 Res	8.0	56	1.5	55	Chs	1 beam	1-beam	Jon2.	36x2 3	I pri	11.5	Semi ell	Semi ell	Spl Des	2,200
	91	58 50	12		Chs			16x3		Hubs	1 3	Platf	Platf		2.850
	96	51	12	45	Shaft	Tubular	Tubular		1423 1					Channel Steel	2,200
	92	50	12	47	Che	I beam	Porged	34%3	1423 1	Exp		Seens ell	Semi-ell	Pressed Steel	2 300
Fa ZRes	100		12		feest.			36x3 5	Jox 4	N lec	Hubs	Semi ell	Semrell.	100	2,550
Pad 5 Res	6.6	511	12	5.5	Chs	1 beam	Rect	12%3	3423.	Exp H	15	Senni ell	bemi-ell.	Channel Steel	1,400
Furl 2 Rev	102	OAT	10	65	Chs	Square	Round	3000	1132 1 3	Hobs		Sen i ell	Semi ell	Channel Steel	
	97.5	56	817	2.5	Che		Tubular	52% 1.	30x3.	H bs	15	bemi-ell	Pull-ell	Commission Steam	2 000
	104	58.5	0.2		Cha		1 00 111111	1635.4	12×4	Hubs		Semi-ell	Semi ell.		
	94	6.8			Cha	1.		3 23	311% 3	Hubs	Land.	Semi-ell	Semi-ell.		
Paul 5 Rev	96	62	1.0	50	Chu	1 beam	Rect	342.5	3124	Hube	IJ S			Channel Steel	1 650
			9	4.5	Che	Tubular	Tubular	Opt		Hubs	Hubs	semi ell	Nems ell	Channel Steel	
	120	1.2	10		Georg.	Continu	Tuousa	16×5	36x3 3	6 Hubs	11001	Same of	Sem off	Pressell Steel	1 200
Pwd2 Rev	116	1			111000	1 1 1				Hube					1.1 000
Fwil 2 Res			9	4.5	The	Round	Round	308 8	56x2.5	Huba		Semi ell		Channel Steel	
			1.5	60	Che			Chai		Hulm		Sem eli	Senu ell	Chanuel Steel	
	117	62.5	9.2	3.5	Cha	1		Stoc 5 Opt	3883 3	Hubs.	1	Semi ell	Semi-ell	Channel Steel.	1
			1 5	30	Cha			Opt		Hubs		Semi ell	Name of	Channel Steel	
	118	1.1		-	Chs		1	1085		Hubs		Semi ell		Channel Sterl	
	133	62	16		Cha		111111111	36%5		Haha		Semi ell	Plate	Wood & Steel	
Pud 2 Rev_			10		_thear	in	Married .		p Ana.3	DElec	History	Senio el	bems ell		4,200
Pum 2 Rev	126	6.5	5 0	60	Cha	Round	Round.	Jex6	10841			Semi-ell	bent ell	Channel Steel	1
Fwd 2 Rev.	132	13	7	2.5	Gear			I SKA I		Mer	Histor	Service of	bent ell	Channel Steel	4.030
	96	7.2		,	Grears	Trussed	Trussed	Jox 4 1	2 5684 S	lec		Semi ell	Semi-all	1 beam	3,000
4 Pwd 2 Rev.	110	6.9	7	2.5	Cha	Round	Round	360.7	Hear 5 I			Semi ell	hemi-ell	Channel Steel	3,000
	126	7.6	7.5		Chr	,	1	11 o.7.	Hillman I	Mehs		Bem elt	beni-ell	Channel Steel	1 0

New Ommercial CarAccessories.

Patton Safety Starter Crank,

The lation safety starter crank, heing marketed by the Pation Crank Company of Chicago, is designed to eliminate any possible danger of cranking and is so constructed that the slightest tick will release its locking mechanism. The instrument is similar in appearance to the ordinary member, which is removed when the Pation is sited, the operation involving but the drilling of a small hole and the drilling of a small hole and the drilling of all the drilling of a small sole and the drilling of a small sole and the drilling of a pink property of the drilling of a small hole and the drilling of

Quick Detachable Rim Remover.

A device for facilitating the removal of the locking rim used with Universal or Firestone quick detachable tires has been invented by William L. Tobey, East Hoston, Mass, and the instrument Is very compact and inexpensive. It consists of a finage which fits over the rim, carrying an adjustable bott with a slotted head. The tool is inserted at the joint of the locking ring and by turning the threaded member the clindeer ring is forced from position as decasted as the consistency of the control of

Dover Gasotine Funnel.

A new gasoline founel has been brought out by the Dover Stamping & Manufacturing Company Cambridge, Mass., and is especially adaptable for commercial vehicles. The device is nade of extra heavy galvanized steel and designed to withstand hard service. The spout is larger than the standard funnels and is seamed to the hody, not sold-ered, this arrangement eliminating the danger of breakage. The spout and lower part of the hody are headed so that they will not become airhound in any size opening. The funnel is fitted with hoops to hold the chamods and is also equipped with fine brass gauze for filtering purposes. The device is made in two sizes, our and eight quarts, respective.

A. C. Waterproof Spark Plug,

Moisture and water seriously interfere with the proper operation of the spark plug and to prevent the high-tension current from taking paths other than intended the Champion ignition Company, Flint, Mich., has brought out a unique type of waterproof plug. This feature is obtained by the design of the member lised, instead of by extra fittings. A colled wire or spring leads from the centre electrode and forms a connection with the end of the high-tension cable which fits into an opening in the processin bood. The latter has a horizontal projection about .75 linch long, and there is no chance for the water to short circuit the plug. The hood, which is held by a clip, is fitted with a threaded tube into which the wire is acrewed tightly. A frature of tie plug is that after the bood is removed there is no exposed insulation to be broken by careless handling.

Ejectroboia Lamp.

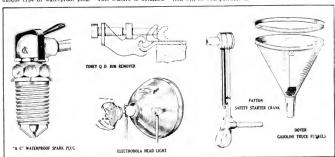
Electric lighting on the commercial vehicle presents a saving in time, which is an important factor in motor truck operation. The Electrobola Lamp Company, Milwaukee, Wis, is manufacturing a practical lamp for such service, permitting as it does the replacement of a broken built without unlocking the door. The bubb is fitted to a socket, and is locked in position by a serve. The lamp is a one-piece aluminum canting with the interior highly polished, and is claimed to be dust and moisture proof and that It will not targist.

ST. LOUIS IN FEBRUARY.

Although the dealers in St. Louis, Mo., already have held one display of 1912 models, this having been held in the open air last fall, plans are under way for two more in February. The second week, Feb. 12-17, will be devoted exclusively to commercial vehicles.

BIG DISPLAY FOR ATLANTA.

Not since the national show of Nov. 6-13, 1909, has Atianta, Ga., held an automobile display. This year, the Atlanta Automobile & Accessory Association has been organized for the purpose of holding an exhibition in the Auditorium armory, Feb. 10-17. Coming so soon after the close of the Chicaco show, it is anticipated that a large number of the exhibits at that display will be the commercial working and the present interest in this type of transport throughout the South is sufficient indication that this section will be well partonized.



THE A B C OF MOTOR TRUCK OPERATION.

A Simple Exposition of the Principles Underlying Operation, Maintenance and Repair of All Motor Driven Commercial Cars, Outlining Details of Components.

Part XV--Necessity of Speed Changing Devices and Their Forms.

By Morris A. Hail, M. E.

EVERY gasoline automobile must have a speed changing which the motor operates. As previously pointed out under the heading of clutches, the internal combustion engine has a certain well defined limiting power output, which may not be a certain well defined in the combustion engine has a certain well defined in the combustion of the certain page. In the cordinary use of the head of the combustion of the road where stops are necessary or in the extension of city traffic, this speedily is apparent. Whenever the machine is started, either from rest or from a pause or delay which has limited slower speed, it becomes necessary to lighten the load on the motor.

This may be done by slipping the clutch and speeding up the engine, then letting the former in very gently, or as is the case more often, by changing down to a lower gear so soon as the rate of crankshaft rotation must be cheeked. The latter method gives the engine an advantage in that the lower the speed of car through its gearing, the greater the amount of power delivered at the road wheels. Although the engine maximum output remains unchanged, these different methods of using it give the equivalent of a much greater amount of power.

To prove this by means of a practical and everyday example: Take an engine which develoys 46 horsepower and is used in a car, the three forward speeds of which give respectively, 3.2, 5.3 and eight pear ratios; that is, on these various speeds, the motor will turn 1.2, 5.3 or eight times various speeds, the motor will turn 1.2, 5.3 or eight times to one of the road wheels. The power exerted at the wheels varies in the exact ratio of these three figures, developing the issus when the first named is in force, more violent in the second combination, and the most when the third or low speed mechanism is engaged. Obviously, when the load is light, the highest ratio will be utilized in order to bring forth the great speed which this also gives.

When the load is much speed as understand as a keep bill or the read of the load is much speed as understand by the load of th

It has been expanied that starting a car throws onto the motor the higgest land of all, as by the laws of friction the motor the higgest land of all, as by the laws of friction the greatest amount of power is required to start a body from a state of rest, having in mind that necessary for maintaining it in motion. For this reason, the trick is always expected to go away from a standardil at its allowest speed, passing to a higher rate only as it gains momentum, when less power is required to propel it and more of the available engine output can be converted into speed. This is true of all cars, regardless of size of type, but the frester the total load, the lower must be the starting speed, and the longer must the accelerating process be prolonged.

The reverse of this last statement is equally true; the lighter the whole weight carried, the more easily and quickjumy the weighte he brought up to a high rate of travel, in fact, on very light cars in the hands of expert drivers, it is not always necessary to change down to the iowest speed for starting, this being accomplished on the second or intermediate, as it is called.

However, the exigencies of starting and atopping do not constitute the sole function of the speed changing gear or transmission. There are for instance, those who do not

wish to travel fast. With a car which is capable of say 50 miles an hour with the above mentioned gear ratio of 3.2 on the high, it might he that it is desired to go no faster than 30 miles an hour. In this instance it would be possible to choose between slowing the motor down until on the high gear this rate was produced, or of changing to a lower speed and letting the engine maintain its high rate of travel.

This argument might be said to refer specifically to pleasure cars, but with commercial vehicles the various speeds are even more necessary. Take a vehicle of one ton capacity designed to travel at a maximum speed of 25 miles an hour. If this were used in an emergency to carry 2800 pounds, no such speed would be expected of it. On the contrary, more power would be needed simply to keep the car in motion with the heavier load, necessitating, as previously pointed out, a lower gear reduction, or as it is commonly called, a lower gear.

in the transportation of goods, the reliability of delivery is of greater value than the actual time consumed. So, although the commercial car has a sustained speed two or three times that of the horse, certainty of arrival at its

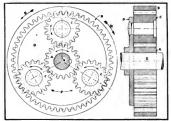


Fig. 61-Sketch to Hustrate Action of Planetary Transmission Lord on Many Low Priced Delivery Cars.

destination is of equal or greater import. Where there are hills, bad roads or pastements, for or ano, or other possible obstructions, the vehicle must have sufficient power on the lowest gear to extricate itself. In short, this means that on a commercial car the slower speeds are of even greater value than the higher. It is for this reason, that four and five-ion trusks often are found with a low speed would call for about vive that as a minimum; the maker cannot afford to take any chance and must gear his vehicle to a point skerce he and the huyer are absolutely safe.

These basic principles apply whatever the type of transmission; in fact, the latter does not enter into the discussion until later, aithough as will be pointed out then, the form which gives the greater number of possible speed changes would be fitted to commercial work best of all, other things being equal, for then the neculiar combination of the greatest pulling power with the highest speed can more or less beloat combination and one within the for replicated in practise even by those devices designed for that specific purpose.



Fig. 82—Friction Form of Speed Changing Device for Commercial Cars, Showing Components and Materials Used.

Generally speaking, all forms of speed changing devices are available for commercial work, although there are inherent reasons in each one now in use which fit it best for some particular division rather than for all. There are four types of mechanism available and now used for this service: The planetary or epicyclic form of gearing; the friction transmission; the more usual silding gearset, and the fluid devices which may be add to include as well electrical transmissions. There is a possible fifth class, in which might be placed the flat leather belt drive with a service of tight and loose pulsys and belt shifters, etc., but these may be dismissed as having gained no permanent place as

The planetary transmission derives its name from the grouping of its gears in the form of a una and planets surgrouping of its gears in the form of a una and planet surgrouping. It is fact, the correct name for it a number of years go was sun and planet gearine. Stated broadly, years go was sun and planet gearine. Stated broadly, two, three, four or more sets of pinlons, driving from it. If the two were of equal size and the planets fixed in position, there would be no difference in number of revolutions or power developed. On the other hand, when the pinlons are larger than the driving gear, as is always the case, the

former are rotated at a slower ratethan the latter. This is when all are held in position, but when the planets are allowed to travel as a unit around the central membera double motion is gained; one part from the drive by gear to gear, the other from the rotary movement. According to the direction and manner in which this occurs, it is either additive or aubtractive. That is, when moving around in the same direction as the driving gear, a higher speed than when standing still is obtained but if by a combination of gears and other parts, motion in the opposite direction or against the rotation of the driver be obtained this may be slower than when the planets stand atlil as a unit. By carrying the latter to an extreme, an entirely opposite or reverse motion may be obtained, which is the case in the usual au-

tomobile or motor truck transmis-

A sketch of a gear of this type is shown at Fig. 61, in which the pinion A is connected to the crankshaft of the engine or clutch shaft as the case may be, and drives the others. The three planetary gears C revolve freely on their spindles or shafts which are fixed in the plate D. The drive is taken from the latter by means of shaft, chain or otherwise. When the internally toothed ring B is held and the pinjon A revolved, the planetary members are caused to run around the ring and carry the plate with them in the direction of the arrow marked F; that is, in the same direction as the driving gear. The speed, however, is aitered. This is equal to the ratio of the number of teeth in the pinlon to those in the ring plus one gained by the enforced left handed rotation around it. In this case, A has 18 teeth and B 54, hence the speed reduction when the latter is held is as 18 to 55 or 3.05

If the internally toothed member B be forced to act as the driver of the set, it is apparent that the resulting direction of rotation of the gear A will be opposite to the final movement as just described or rather as indicated by the second arrow H. Moreover, so doing it will gain speed through the double motion imparted to it; one by the revolving.

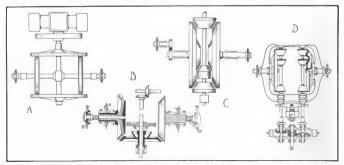


Fig. 63-Four Differing Types of Friction Transmissions, Bringing Out the lise of Spur and Beyel Black and Combinations of These.

the gears C, and the other by the motion of the planet as a unit represented by the plate and gears. In this case, the increase of speed would be as 54 minus one to 18, or 2.94 ratio.

In those modern gears in which the internally toothed member is used, the planets are arranged on as to have upon each spladde a second gear larger or smaller than the first and meshing with an additional central gear of corresponding size, the whole in a plane parallel to that of the set shown and the planets carried in a plate like D with an external draim on which is a band for gripping it and thus producing one speed. The internally toothed member also has a wide external face fitted with a second band, while a form of citeth is used to champ the whole, philoto, planets a form of citeth is used to champ the whole, philoto, planets and the producing one of the produces the high rate, the holding of the internal gear as first described, the slow, and the gripping of the plate D carrying the planets, the low speed.

A little study will show that holding the plate D, when the pinion A drives and there is a secondary gear to take the final drive but no internal gear, is equivalent to the tion of the latter out from the centre of the former determining the speed. This is apparent when it is considered that the resolving disc has varying rates of surface travel from the centre where it is zero out to the edge which turns at the maximum rate. Obviously by placing the driven disc at either point it will be given one of these two speeds, and in the positions between, all of the possible traflations.

The discs are held in contact by means of strong aprings or are forced together by a mechanical device such as a toggle lever combination. Usually, the driver is movable, the ordinary clutch pedal being used to actuate this. Another pedal or lever moves the driven member across, this combination effecting the suped changes. One of these is shown in Fig. 52, which depicts the Lambert device. This out the driver, As marked, the latter is an aluminum faced unit, while the driven disc has a fibre friction face. The other details will be found self-explanatory.

Although this is the more usual form, it should not be thought that it is the only one. In fact, there are many different combinations, some utilizing the so-called spur wheel, others the bevei forms, and a number, both. In

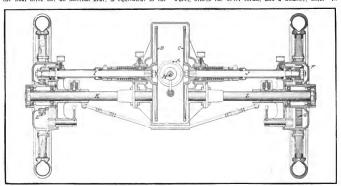


Fig. 64-Rent Axle and Frictinn Transmission of a Well Known Commercial Car, Showing Some of the More Important Structural Details.

second case, in which above, it was supposed that the internal member was the driver and the result an increased speed. Inverting this and holding the plate will give a lower reverse speed in the ratio mentioned, 2.94. In practise, the pilions are selected so as to make a greater difference between the low and reverse speeds than this example would show.

This is the usual American form, the internal sear baring been ubandoned a number of years ago for several reasons. Chief among these were its first cost, which was high,
with a correspondingly high replacement charge when this
was broken. A point which might be mentioned before leaving the subject is that the number of pinions can be equally
spaced only when this number will divide the teeth in the
table to the control of the control of the control
to the case shown, three can be used but four could not.
With the other more widely need form, the design is not
subject to these limitations.

Friction transmissions produce power through the surface contact of one revolving wheel and another which it is pressed against and thus, forces to turn. Usually, the combination is such that the large flat face of the driver contacts with the narrow edge of the driven member, the posi-

Fig. 52 a group of these is shown, that at A being a four spur wheel combination. This is made in two different types, that shows being that in which each member parallel to the drive shaft connacts with but one at right angles to li, the two brives of the driven shaft being separate. The forward driver turns the right band disc and the back member the left hand unit, both in the forward disc turns both driven parts on sieves ahead and the one at the back driver shaft to turn in opposite way, before one of them must carry an additional spur gear arrancement to change the direction of motion so as to agree with the other.

At It is shown a combination of sour and bevel types, In which there is a direct drive on the high gear, no frictions being in contact then. The normal drive is from the engine to one bevel which propels the other two. This would give but one speed with the high making two, so the squris introduced to produce a large number of additional variations.

The forms at C and D are of the all bevel type, a number of these belig used to produce the required list of speeds in each direction. In both types, the gear reduction to produce both speeds in the same direction at the final points will be noted. in C this occurs back of the transmission and in D ahead of it.

Fig. 64 depicts the entire rear sale and transmission construction of a car, in which the speed changing device is of the friction type and incorporated with the final drive on the rear sale. In this, if it is the driving siasift, which carries the sildable member A, contacting with both II and C. The former in fixed to the shaft I, with the grar I at Its outer end. This is of the spur type and meshes with another similar member E turning on the sale K. The other disc C drives the shaft J which has the spur grar F meshing with the internal gent G, through which motion is discussed in the internal gent G, through which motion is discussed in the internal gent G, through the orange of the sale that the internal gent G, through the orange of the sale of t

Ed. Note—The next installment will take up the various other forms of transmissions, including the sliding gear, in both progressive and selectively operated types, etc.

MARTIN TRACTOR HAULS COAL WAGON.

After subjecting the Martin tractor, the invention of Charles H. Martin, to a series of severe tests which occupied Among other rainus advanced by the designer are the following: That it eliminates many of the complications following: That it eliminates many of the complications of conventional motor truck construction, while it gains in the state of the contraction of the contraction of the contraction of the contraction on stiff springs, the engine and working parts being carried on springs as resilient as those fitted to the piesaure automobile, and that it saves the cost of rubber three since it utilities gated members.

Among the possibilities of a motor vehicle of this type is that of servine a feet of the horse drawn type. Assume that a large quantity of material was to be convexed from the base of supplies to a point several miles away, and that five double-horse teams were formerly emploxed in the transportation. By utilizing one tractor it could be made to serve them all by disconnecting the king holt of one of the horse drawn wagons and raising the hody when the motor propelled vehicle would be free to be attached to another body which had been similarly treated, and loaded, in this manner the automobile would be kept in constant service and considerable time award in hadding the material.

MANY DELIVERY CARS ON COAST.

H. O. Smith, president of the Premier Motor Manufacturing Company, indianapolis, ind., who returned recently from a visit to the Pacific Coast, states that he was



Martin Tracter, Produced by the Koox Automobile Company, by Means of Which Horse Brawn Vehicles May Be I illised,

some months, the Knox Automobile Company of Springfield, Mass., displayed the device at the New York show, where it attracted considerable attention. The tractor is so designed that it may be attached to the front axis of any horse drawn vehicle, and in the accompanying Illustration is depicted the device hauling a coal wagon. When this littled the fivewheel combination is said to take up less room than were the animals attached.

Mr. Martin devoted considerable time to the haulage problem, and the device is the result of much study and experimenting. He claims that it will effect a great saving over the conventional motor truck design on account of its first cost being about one-half of the motor car of the same cinquiety, while the upkeep will be proportional. In addition, the possibilities for its use in connection with a feet of wagons gives it a corresponding economic value.

The tractor consists of a frame supporting the power plant, and transmission machinery, which is geared to the front wheels and axie of any horse drawn vehicle. It is provided in from with a single wheel for steering, this heing necessary in order to swing the frame, which corresponds to the pole of the wagon, to the right or left just as horses would. The arrangement of the wheel is such that it can be torned at an 3t-degree angle, and among the advantages emphasized is that it is possible to obtain a shorter turning radius by its use. very much impressed with the large volume of business transacted with the aid of motor delivery wagons. Cars capable of carrying a iond of 500 pounds to 1.5 tons are favored, and these are more extensively used than in the East.

GENERAL MOTORS HAS NEAT BULLETIN.

The General Motors Company, Detroit, recently mailed to its agents and customers, an utusual butletin. It was appropriate of Christmas, depicting as it did, Santa Claus driving a G. M. C. truck loaded with toys which were tagged with names. The butletin was printed in colors and contained a modern adaptation of "The Night Before Christmas."

LUCE CONFERS WITH COMMISSION.

Morton H. Lauve, chalrman of the signboard committee of the Chicago Motor Chib, was in Moton recently conferring with the Masschusetts highway commissioners relative to data to assist the State of Illinois in posting relasigns. Mr. Lace is manager of the Chicago branch of the Yelle Motor Vehicle Company, Mollien, Mr.

FURTHER DISCUSSION OF ANTI-FRICTION BEARINGS.

Mr. Thomas Remains Unconvinced That Mr. Page Is Correct in His Position Regarding Worm Gear Mounting-Mr. Younger Gives Decisive Support to Mr. Thomas' Argument.

OPPORTUNITY was offered in the last issue of MOTOR TRUCK for H. Kerr Thomas of the Pierce-Arrow Motor Car Company, Buffalo, N. Y., and Victor W. Page of the New Departure Manufacturing Company, Bristol, Conn., to discuss their differences of oninion regarding the use of antifriction ball bearings in connection with worm gearing. Mr. Thomas criticised certain statements made by Mr. Page in an article on this subject which appeared in the December number, and Mr. Page made extended reply thereto.

It would appear from the correspondence below, that Mr. Thomas is still far from being convinced that Mr. Page's position is correct. The controversy is made even more interesting by the appearance of a letter from John Younger. also of the Pierce-Arrow company. MOTOR TRUCK feels that its readers will be sufficiently interested in the matter to warrant presentation of both communications.

Editor, MOTOR TRUCK

Mr. Page's pungent criticisms of my observations on his original article compel me to ask you for further space in which to reply.

Mr. Page considers I place too much reliance on the experiments of Beauchamp Tower, showing friction decreasing with increase of power in the case of journals with oil hath lubrica-tion, and in support of this he exhibits a table showing how tion, and in support of this see estimate a time seasing to that authority found the coefficient of friction rose with in-creased pressure in his experiments with very restricted drip ceramed pressure in his experiments with very restricted drip fred. The two cases are cuttirely dissimilar since no one will ast-tempt to run any worm gear without continuous and copious jubrication. Why then bring in the question of riction be-tween dry surfaces? We are not discussing cone clutches, and are to uncertainty of lubrication, it will say at outee than if there is any uncertainty about it such genting will not work is any uncertainty about it buts genering will not work at air it is usual in well designed axies to make them oil tight so that there need be no fear of any oil leakage but under no circumstances are both worm and wheel immersed in oil when stationary. Lauchessier placed his original worm beneath the wheel, insuring the point of contact being covered with oil. The wheel, insuring the point at contact being covered with oil. The majority of designers have, however, the contact with the majority of designers have, however, the house may the oil to where it is wanted if Mr. Dage has the curfority to open the cover of such a gear when it is running a ven slowly, he will see that the worm is running in a perfect oil hatch and is its fundamental to the contact of the majority of the contact is a perfect of the contact of the contact is made in the contact of the

Mr Page makes one statement, however, which with every respect, is firstly incurrect and secondly, misleading He says Lubricant cannot be introduced between bearing "Labrican' cannot be introduced between bearing surfaces if the oil filing preserve is greater than than of the head of the orbitany line shaft bearing receive any oil from a cybient, when the bearing preserve is, say 200 pumple a sittem lines has the Title correct answer is given in Mr. Page's own drawline (Fig. 1) where the rotary shaft is shown sweeping the oil round special oil in a layer which causes actual separation of the two surfaces. This is even more noticeable in worm securing

where the contact is made helween two contex surfaces sweet-ing over each other and carrying the lubricant belween them

must plead innorest of having formulated any theory regarding friction—in the tirst place, I embraced Unwin's theory, and acknowledged it fully in my former letter; it is however, a fact that a great deal of research has shown me has indeed might have been anticheded; that it is correct. Nevertheless, some acquisitione with the tementary principles of machine construction has litherto prevented me from attempting such an abundity as increasing learning pressure to clinimate freethen, which is the reductioned absurdum of Mr. Pages argument in following out which he has confused the effects of friction

with its coefficient in a specific case.

Mr. Page's quotations from Mr. Alford have no direct bearing in the subject as they refer to collar hearings which I had on automobile worm gearing I have never advorated their

Next with regard to methods of mounting. I have nothing to 1 unbestratingly say that while add to my former remarks. and to my former remerks. I unossitatingly say that while a worm spindle may work well with a tirried bearing at each end it is more likely to do so if both throats are placed at the rear with provision to expand at the opposite end Mr. Pogescal-culation shows that with 200-degree by the rature rise. The worm

may expand .01 inch, and as it should be mounted without any end may expans, or inch, and as it should be measured without any che clearance, this, if it took place, would make it dangerously light, at the same time, I have never heard of such an extreme light, at the same time. I have never heard of such an extreme emperature rise taking piace, and the relative expansion between worm and case is much less than the calculated figure. I succe with Mr. Page that the arrangement shown in Fig. 5 ought to be entirely satisfactory.

Next with regard to end thrust: I really must maintain that Mr. Page has seriously underestimated this and has moreover, misunderstood my remarks. Let me endeavor in make the matter clearer

The maximum pressure which can occur on the periphery of the worm wheel is timi which will mearly cause the road wheels to skid when the car is fully louded. This skidding may be caused by: (a) sudden application of engine power; (b) lock

be caused by: (a) suddlen application of engine power; (b) nea-ing of brakes if fitted on the Iransimission shaft.

Take the case of a five-ten truck, the loaded rear axis weight will be say 16,000 munds and the coefficient of friction between lires and road is say, 625, making the resistance beseemen tires and road in say asse, making the reseased between road and wheel 10,000 pounds. The radius of the road wheel being say 20 inches, and that of the worm wheel say sevch luckes, the pressure between worm and wheel teeth will be

10,000 > 20 - 14 500 nounds

not very far removed from what Mr Page calls my "guess" in my last letter. Nearly all of this hand has to be carried on the my hast letter. Nearly all of this hand has he be carried on itse litrust hearing of the worm, but fortunately this force does not above, just hefore the wheels begin to slide over the read-either from the application of too much power to a stationary, or too much to receive the state of the stationary or too much to receive a ball hearing its inches in dismeter, as Mr Plage analyst suggests, to carry such a had at 126 revealttons a minute

tions a minure.

t'oming to Mr. l'age's last three paragraphs, I have re-read
my former letter. There is nothing I said which could by any my former letter. There is nothing I said which could by any stretch of Imaxination be supposed to indicate a preference on my part for idain collar thrust bearings and I must directly contraded Mr. Page when he says I slated such bearings have longer life the more load one puls upon them. With the ab-surdity of aucti a statement, I cordially agree, but the statement sardity of such a statement. I cordially acree, but the safetiment is Mr. Pages sent mine-and having built warm driven asks measure of success, I can assure Mr. Page that such experience as I have gained in that time is not the result of the of worm great to be achieved by "the little use of pencil and pages," intelligent or attempts, or even by the reference to the paper," intelligent or otherwise, or even by the reference to the few formulae and tables which appear to have led Mr. Page into paths which have not hitherto been followed by those design-ers of worm gearing who have been responsible for bringling it lo its present state of perfection. Yours truly

H KERR THOMAS, A. M. J. Mech. E. M. S. A. E. liuffaio, N. Y., Jan. 19

Editor, MOTOR TRUCK:

Site of worm sexting on all kinds of horselves whitee The use of worm sexting on all kinds of horselves whitee the sexting of the sexting of

entirely institishie criticism places matter another light, and I hasten to add my quota to support of Mr. Thomas.

instead of taking some pencil and paper I would advise Mr Page to spend a few dollars in some correspondence contro and make acquaintance with some of the more elementary roles of mechanics. Newton's fundamental law states that action and reaction are count and opposite. That is if there is thrust at the road contact of an automobile rear which, their is a curresponding but opposing thrust in the mechanism the case of a driving rear axis the thrust at the road contact is balanced by the thrust of the worm spholic which in its turn is prevented from rotating the asic casing by means of a

Taking Mr. Pages figures as given in your issue of Decem-

to it. It delivered at worm spindle at two rpm of notet -Ratio of reduction

Reverse 32—1 glylug 32s ft, per minute travelled Low 24—1 glylug 440 ft, per minute travelled. Second 16—1 glylug 655 ft, per minute travelled. (Assuming a wheel diameter of 40 inches.)

The text step is to state that the efficiency of the worm gearing neglecting the bearings is about 25 per cent, not \$5 per cent, which is the efficiency of the whole rear axle with bearings, it am neglecting the bearings because I am only con-

sidering the action between the forward end of the worm spindle and the rear end where the thrust is taken, and it is undle and the rear end where the threat le taken, and it lo unrecessary to take lorses into your calculation when you know meeting the state of the two pushes at the rear wheels assuming, as will be the case, that the motor will be written to capacity, are the state of the state

Now this is at 26 inches radius, and on the principle of leverage this is increased in proportion to decrease of lever, i. e., in proportion 26 to 6 tradius of worm wheels) so that these thrusts resolve themselves thus.

Reverse 3.33 × 3800 equals 12600 pounds. Law 3.13 × 2850 equals 9500 pounds Second 3.33 × 1920 equals 6100 pounds

These pressures are approximately 18 times Mr. Page These pressures are approximately it times Mr. Pigge's, and to do its white many provided by the provided by t

gearing on pleasure rare or possibly light! trucks to design a militable gearing for houry trucks. There is, however, one by experience and it alters the whole complexion of the case. Mr. Thomas calculation of Josum pounds is evidently hand on braking pre-sure under maximum conditions, and is as ex-tended to the control of the control of the case. Mr. Pace assumes much indignation that anyone should thing more almost the control of the case of the large design of the control of the control of the thing more almost the militant to the control of the G1, December Issue, he states that even with the worm in-stalled above the worm wheel it is almost impossible to obtain the desirable 12 inches ground clearance. On page 64, January, he forgets all this and states that where large traction wheels

are fitted as on the motor truck, the worm can be housed very are fitted as on the motor truck, the worm can be housed Very caselly under the axie as the requisite ground clearance can be obtained very readily. Which statement are we to believe, as really tell-inch distribly wheels are quite large stated wheels, and obtaining conditions do not warrant us placing on lorage? In all my experience of worm gravitus, contined almost em-

In all my experience of worm generating continued almost en-trely to the out-friend type. In these out is continued almost en-trely to the out-friend type. In the out-friend the bost-ton of the case was opened in some manner and the old ran out unmutted, the other was due to all budying been foracted after reasonablemed and the out-friend the out-friend after reasonablemed in the out-friend the out-friend the ween the touch forces no matter how tong the truty, has been reasonable out-friend the out-friend the out-friend the second

rivers the first private in matter now using the truth has constanting, provided of contract, that the case of matter in the action of the action of the matter and the matter are not distilled evenly, as Mr long thinks on the position of the work and along the matter are not distilled evenly, as Mr long thinks, style they are unauthous in favor of the overfload system, as introduced by John Demons in 1901. In 18th pleasure care the Introduced by John Denius in 1991. In light pleasure cars the overliead system decledly prependerates, and in the other cases, I question if intrication has had as much influence on the location as had low centre of gravity all acount

the healthn as had low centre in gravity and conton. The use of worm gearing on tracks brings up some curious problems and only practical experience can determine their solution. Mr. Pages should gain some of this experience under actual road conditions, and then make full use of his intelligence to deduce his theoretical basis on which to build his

1 nors (ruly, 2018) Mochanical Engineer, Commercial Vehicle Department of Pierce-Arrow Motor Par Company, Buffato, N. Y., Jan. 22.

N THE MARKET FOR DNE DR TWO TRICKS.

Editor MOTOR TRUCK.

We would like to have it known among the manufacturers of commercial vehicles that we are figuring on the purchase of one or two motor trucks for deliyering Portland cement and other scaterials. Nothing less than a three-ton truck would be of any service to us and we would probably prefer a five-ton truck, if it can be shown that maintenance costs are not ex-

We wish information us to price, estimated coand actual cost of upkeep, as shown by the experience of vari-ous users. The experience of building supply dealers is much more valuable to us than any other kind Yours very truly.

KOSMOS PORTLAND CEMENT CO. Inc. Charles Horner, Vice President. Louisville, Ky., Jan. 23.

CALENDAR OF COMING EVENTS.

February. Feb. 28-March 2-Sbow, Davenport, Ia. March.

Feb. 1- 7-Show, Washington, D. C.

Feb. 3-10-National show, Montreal, Can.

Feb. 3-10-Show, Harrisburg, Penn.

Feb. 5-10-Commercial car ahow, Chicago, Ill.

Feb. 5-10-Commercial car show, Pittsburg, Penn.

Feb. 5-10-Pleasure car show, St. Louis, Mo.

Feb. 5-10-Show, Buffalo, N. Y.

Feb. 5-10-Show, Bangor, Me.

Feb. 10-17-Show, Atlanta, Ga.

Feb. 12-17-Commercial car show, St. Louis, Mo.

Feh. 12-17-Show, Memphis, Tenn.

Feb. 12-17-Show, Ottawa, Can.

Feb. 12-17-Show, Fall River, Mass. Feb. 12-17-Show, Kansas City, Mo.

Feh. 12-19-Show, Dayton, O.

Feb. 14-17-Show, Grand Rapids, Mich.

Feb. 17-24-Exposition show, Pittsburg, Penn,

Feb. 17-24-Association show, Minneapolis, Minn.

Feb. 17-24-Show, Newark, N. J. Feb. 17-24-Show, Cleveland, O.

Feb. 19-24-Show, Omaha, Neb.

Feb. 19-24-Show, Hartford, Conn.

Feb. 19-24-Show, Cincinnati, O.

Feh. 19-24-Show, Portland, Me.

Feb. 20-24-Show, Binghamton, N. Y.

Feb. 20-25-Show, New Orleans, La.

Feb. 20-28-Show, Baltimore, Md. Feb. 21-23-Show, Keene, N. H.

Feb. 21-24-Show, Louisville, Ky.

Feb. 21-28-Show, Toronto, Can.

Feb. 24-March 2-Show, Brooklyn, N. Y. Feh. 26-March 2-Show, Paterson, N. J.

Feb. 26-March 2-Show, Eimira, N. Y.

March 2-9 -Show, Norfolk, Va.

March 2-9 -Pleasure car show, Boston, Mass.

March 4-9 -Show, Des Moines, Ia.

March 4-10-Show, Denver, Col.

March 6-9 -Show, Tiffin, O. March 11-16-Show, Cedar Rapids, Ia.

March 12-16-Show, Syracuse, N. Y.

March 13-20-Commercial car show, Boston, Mass.

PROMPT SERVICE WITH MOTOR CARS.

Efficient service and promptuess in the delivery of merchandise are features of the automobile appreciated by both the husiness man and the purchaser. There is, perhaps, no industry where promptness is more desirable at times than in the coal industry. Many times the fuel is delayed in reaching its destination when hauled by the horse drawn equipment, especially when the weather conditions are unfavorable for the animal.

The motor truck eliminates tardy deliveries, is not affected by heat or rold, and is cheaper a ton-mile than any other form of transportation. The practicability of the motor car was demonstrated in New York City recently when one of the large hotels sent in a hurry order to H. L. Herbert & Co., which concern maintains a fleet of Commer cars. Three machines were placed in service, hauling the fuel to the hotel on Sunday morning and at night 240 tons had been delivered. The three cars made 33 trips and one delivered 94.5 tons. These same vehicles, during the first 19 days of December, hauled 2700 tons, includ-ing short and long hauls and during a period of heavy snowfall when the concerns utilizing animals were unable to make deliveries on time

FOX PUBLIC SERVICE MOTOR CAB DESIGN.

Vehicle Having All Desirable Passenger Requirements, Adequate Power and Speed, Designed with Proven Mechanical Construction to Secure Extreme Economy of Operation,

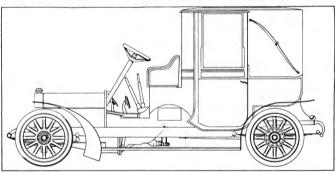
Maintenance and Upkeep—Simplicity and Accessibility the Features.

By Joseph P. Fox.

PUBLIC vehicle service the world over has been with reference to the demands of the people, whose needs may be more or less despendent upon conditions. The utilization of the motor conveyance has in many communities, especially in the larger cities, extended to such service, add companies operating in some instances hundreds of cabs are not unusual organizations. Such companies are organized for pecuniary profit and it is essential that they be profitable, as should be every business enterprise.

It is natural in engaging in any work that experience will develop needs and policies. In the transition from the animal to the motor vehicle it has been found in every baye demanded that such improvements be incorposed by the proposed by the proposed of the pr

135



The Fox Public Service Cab, Designed for Five Passeogers, with Left Side Control on Long Wheelbase Chassis to Secure Riding Comfort and Leases Mechanical Wear,

instance that factors of large importance have been overlooked or underestimated. The essentials of husiness extom or methods have been seldom lost sight of, but ignorance of the use of motor cabs and the changed conditions resultant from extended radius of movement have wrought developments that must be accepted and must be dealt with

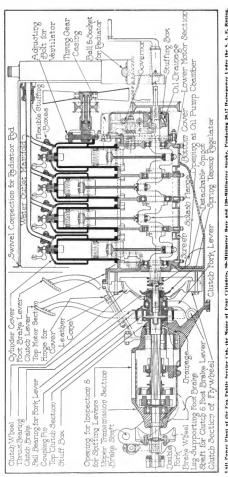
It is impossible to deny facts and it is equally certain that the motor can is the only vehicle that will meet the requirements of the people. The public must have a cab. This demand is imperative and is universal. The people cannot have a satisfactory public service provided by private corporations nulses this can be conducted to a profit rate corporation nulses this can be conducted to a profit businesses. Neither can patronage be impelled unless the face charges are reasonable.

This focuses attention to the cab itself. Indeniably the vehicles that have been in service have been more or less more of less experimental in the sense that each design and construction had not the service to justify a conclusion that it met fully a conclusion that it met fully the demands of every interest. In fact, only after several way ever of use has it been possible to justice with fairness whether or not some machines have been desirable for such acrice. Again with the development of more crar the

would endure under excess work, that would not easily become deranged, that could be restored when necessarily with the least loss of time and an infimum of expense and the theorem of the part of th

In considering public service it has been invariably the experience of the companies that have been profutable that the best equipment that could be purchased was the most economical in that it endured the longest, and appearance that attracted patronage, and met the requirements of the people. This means, of course, that urban conditions are to be dealt with. So far as the people are concerned there has been no change in the quality of service demanded with the transition to the power cab. In fact, the cabs that make the best impression in finish, that have the power and speed, that are the least noisy, are purronized to the rejection of those which have not all or the most of these qualities.

After extended study of the subject during a long engineering experience abroad, where power cabs have been in use for fully a decade, and careful observation of the conditions generally obtaining in this country for a conlined period, the writer has become convinced for the



t of twee Plant of the Fox Public Service (sh. the Motor of Franc Cytladers, Sh-Millimeter Bore and 198-Millimeter Newke, Producing 20,17 Horsepower Loder the S. J. K. Raitan.
This transity leading the United and Transmission, the Whele Heing Residued to a Sectional Housing That Meric ideal Francisco to the Weeksalem, and Which is Exact respective.

Dig and by Google

requirements of public service differ but alightly, while the needs so far as the vehicle itself is concerned are practically the same. Neither is there a material difference so far as the cost of the machine enters into the proposition. While it is true there may be variance in differing items of operating expense it is also a fact that when these are collectively regarded, or even separately compared, it will be found results are surprisingly similar.

I am firmly convinced that the public automobile cab must be at parity with the horse equipment of the large and successful service companies. It must have every quality to impel patronage and to be profitable as an investment. Such a vehicle cannot be low in price or mediocre in design. it must be uniform in every essential detail and it must be harmonious with conventionalities as viewed by the motorist, by the individual who regards appearance and by the person who has merely practical requirements. It must be economical of operation from every aspect, for only hy its aggregate economies will it he profitable. means economy of time through certain and continued speed, through continued service, through immunity against derangement or failure, through accessibility of mechanism when repair or restoration is needed, through ease of adjustment for wear, through interchangeability of components, through the use of the highest quality of material; economy of operation through low fuel consumption, through minimized need of lubricants, through small tire wear per mile driven, through low cost of parts necessary for replacement in restoration, through elimination of the customary causes for wear, through positive lubrication, through minimized labor in ordinary care and attention, through utilization of a large part of the power developed, through certainty of control during every condition of service and through the great endurance of the entire construction

in the matter of appearance it goes without saving that the vehicle will be desirably maintained so long as it is prolitable and is utilized by the people. As a business proposition it must be kept to a standard, and when it has ceased to be desirable for passenger requirements it may be diverted to another form of service, for which it may have practical qualifications. It is not practical to make estimate of the cost of such a cab as I have outlined for so much depends upon the conditions for designing and experimentation, upon the expense for factory equipment, upon the character of workmen, upon the character and quality of the material, upon the quantitles of material purchased, upon the assembling and inspection, and upon the cost of selling. It may be assumed that there will be wide difference in these items according to circumstances of production and where manufactured

Having considered fully all these aspects and requirements I have designed a motor cab which will probably combine every practical quality that is necessary or deairit is not experimental in the application of any principle. Nothing is theoretical. Every construction has been demonstrated to be thoroughly mechanical and every detail has been adopted with a view of creating what will endure hard service and make for economy of operation. There is a wide margin for safely in every element. Despite this there is no excess weight that will entail increased tire wear. The purpose has been to have adequate power with a minimum of fuel consumption, to eliminate friction so far as possible, to use this power to the fullest advantage, to have a sufficient speed to afford a satisfactory service, and have the capacity for the extremely varied work required of a cah.

In this design the chassis and body equipment has been considered, but the chassis will be reviewed specifically and the body installation only insofar as it has been regarded in its relation to the propurtioning of the chassis. Huil is evident that the capacity of the cals and the work it has to do must influence every mechanical detail of the chassis to a certain extent. This cals has been desixted to meet the requirements of the policy regulations of Herlin, Gerter in the complete of the control of the control of the control fortially every confidence of the control of the control of the preserve or folding sense for two additional pressumes of the body, and that there be ample room for the driver and a sear for a fifth passenger beside the driver, making in all six persons that the vehicle will carry without crowding. Another essential is that such eabs be turned in a 10 meter atreet (approximately 33 feet) without cramping or harking. This case in turning is a quality much to be desired in narrow streets and in ordinary country roads, Aside from this it minimizes the element of danger from backing. The wheelhase is 29-5 millimeters, or 1 6.75 mellow, this the purpose of obtaining the additional case in riding so essential for comfort and minimizing the atress of operation upon the mechanism of the vehicle.

The foreign service for motor cabs is exacting in that in many of the large cities it is not infrequent that they are hired for comparatively long Journeys by tourists who do not have their own mechines abrond with them. They are driven over good roads in many instances, but there are indifferent and poor highways in Europe, as there are in this country, and often these ways have gradjents that are several miles in length on which the motor is required to do its hardest work. On such grades as these it is necessary that the brakes operate positively for the protection of the eah and its passengers and for those who are also using the highways.

In cities the proportion of good streets is generally larger than in this country, but in some sections the paying is ancient and driving upon it causes severe atresses when speed is attained. This condition parallels what may he found in the principal cities of America and it is a fact that adjacent to these communities the roads are by no means poor. Very often they are excellent and it is nousual to find the extreme grades to be met with in many European nations. In England, for instance, where the highways are regarded as being very good they are also narrow outside of the towns and cities, and they are quite as steep as they are in continental countries. The roads of France are not without the long grades despite the admirable character of the surfacing of the "routes nationaies," and in some sections of Paris paving may be encountered that would aimost cause an uprising did they exist in

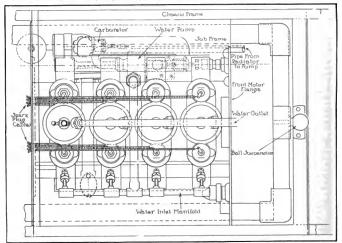
It will be seen that the use of the public cabs in Europe is quite often very similar to that for which touring cars are employed in America. Because of this it has been deemed desirable to make the wheelbase length equal to what may be considered satisfactory dimensions in the l'nited States for pleasure vehicles. There is no question that this produces a better all-around machine even though there may be an advantage with a shorter wheelbase for use in extremely congested traffic. As a matter of fact it is entirely reasonable to believe that the requirements of the cah service in America will more and more parallel those of Europe, and this being so the longer wheelbase can will be preferred because of the qualities referred to. It is the comment of those who have contrasted the types of long and short wheelbase cabs that there is decidedly more comfort with the former, to say nothing of the lessened wear of the mechanism. The same condition applies with other forms of motor vehicles similarly differing.

With any form of motor vehicle the power plant and driving mechanism is the most costly and deteriorates with use proportionate to the care given. The term used covers the motor, clutch, transmission or gearset, driving shaft and rear axle. These must be designed with reference to the service, and the one must bear a harmonious relation to the other. It is not practical to expect a combination that will be in every way antisfactory unless every element is created to meet a positive need or condition, because no weakness ought to exist or develop when it is possible to insure against it. It is almost needless to point out that it is only through analysis of every detail and the most careful consideration of every possibility that the best results can be obtained. This does not mean the use of an inferior or less enduring material because of the first saving in cost Neither does it mean the climination of a part or a fitting that will serve an essential purpose because of construction

economy, nor interior workmandile when explained with GOOGIC

means slightly increased expense. It has been stated by those who comment from experience that initial expenditure for a cab is not the main consideration with the purchaser, for the maintenance cost of the low price vehicle is certain to be relatively much in excess of the more expensive machine. This is not a reason for extravagance in any respect, but is the best argument why no desirable quality should be sacrificed or neglected in designing or constructing.

It has been stated that the elements of the car should be consistent, and this brings us to the most vital group, the engine, which should be no larger than is necessary to yield the service and yet adequate for all requirements. For obvious reasons the motor should be somewhat more productive than is really necessary under the best of conditions because of the fact that it should have sufficient reserve power for the worst. It must at all times do the required work well enough to satisfy the owners and users. It must be economical of fuel, especially in Enrope, where normal requirements and, with a four-speed transmission, it will do every work that ought to be expected, not only of a cab but a touring car. This motor rates under the R. A. C. formula, which is known as the A. L. A. M. rating in America, 20,17 horsepower. Under the French and German horsepower ratings the horsepower is established at 24, which is approximately what it will develop at 1200 revolutions. At 1000 revolutions a minute this engine ought to drive the cah on a level at from 35 to 40 miles an hour. With a touring car equipment the chassis should attain a speed of about 50 miles on the same gear, which is the direct coupling. With the fourth or top gear ratio this speed ought to be considerably increased. These figures are stated to establish the capacity of this engine, which is of dimensions that have been amply proven in continued European practise. While the motor may appear small by horsepower rating this is not a sufficient basis for determination. Judgment should be upon what the engine will accomplish, and with the four-speed transmission it is possible to util-



Plan View of Fox Taxicah Motor Assembly, Showing the Water Inlet and Untiet Manifolds, the Arrangement of the Cables for the Double-Spark Ignition and the Ball Suspension for the Sub-Frame.

gasoline costs approximately double what it does in America, and the operating expense is correspondingly increased. One of the most cogent reasons for the use of comparatively small cars in Europe is the excessive price for fuel as contrasted with its cost in this country.

The motor from the aspect of fuel consumption must be as small and as powerful as is possible. When it is realized that the service of the cab may be from 12 to 20 hours daily and the mileage may be as high as 75, though the average may be from 60 in New York to 50 in Herlin and to 100 ln London the full significance of the saving in gasoline is apparent. This brings us to the matter of cylinder dimensions, which proportions, when combined with engine speed, determine capacity. Considering every requirement of the cab 1 believe that a bore of 80 millimeters (3.149 inches) and stroke of 120 millimeters. (4.724 inches) affords the most practical machine for cab work in that it is sufficient for all

ize the power to decided advantage and yet economize in fuel and lubricant.

In other words, the engine has been designed with a view of having ample power for the service and yet it is to be economical from every point of view. The highest speed is within the 1000 feet of piston travel a minute that is regarded as the maximum for continued use, and the normal operation of the motor ought to be from 800 to 1200 revolutions. Within this range with the four speed changes every requirement should be met without overtaxing the engine. A near approach to Ideal operation would be a comparatively slow speed motor giving any desired car speed on slight grades and over roads by the spark and gas, but still having a full reserve for starting and for heavy grades by a sufficient range of gears for the desired speed without racing the engine. Such conditions only make for economical and satisfactory service. With the use to be made of

the cab it is necessary that every factor that will make for endurance he utilized to the fullest extent and so far as possible the vehicle should be driven well within its capacity and never to its limitations. This fact has been regarded throughout the design and provision has been made to prevent what might be termed abuse or over-taxing the machine

The choice of the motor dimensions and the character of the transmission are two decidedly important factors in cab design To my mind on them depends very largely the success of the entire proposition. But no less important is the construction. For instance, the hushings should be as numerous as is consistent that the stresses upon the shafts be minimized and leverage pressure be eliminated or reduced to the lowest degree, so that both bearings and shafts will wear for a long period of continued use without noticeable deterioration. Every bearing must be of a standard type that they may be replaced at any time without special fitting. The bail bearings made by a well established firm would meet with all requirements, for such are usually standardized and a new bushing case will fit exactly in the seat of that replaced. In this design aside from the connecting rods there are no plain bearings used. All others are of the hall type and these may be removed and replaced by others without fitting. The wristpin and crankpin bushing are of a white bearing metal and are of liberal length as they take the blow of the explosions in the cylinders. It is to be noted that the use of such bearings minimizes the friction and allows the fullest delivery of useful power at the traction wheels.

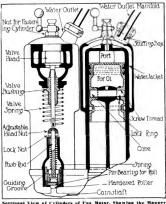
in connection with the use of ball bearings it should be stated there are five main hearings for the crankshaft, each of them of large size and firmly seated in the webs of the engine case. With these there is no stress upon the crankshaft that is not well within its capacity for resistance. The camshafts are mounted in three large ball bear-ings. The shaft extensions that earry the timing gears are similarly mounted, and in the clutch, transmission, the driving shaft, rear axle, front wheels and in every part where such hearings can be installed they are used. This form of construction may be regarded as expensive, but this is one reason why the motor will do the work that has been stated, why the motor is economical of fuel, and why it will endure and is inexpensive of maintenance. The economy more than offsets the initial cost.

One of the most essential features of design is that the working mechanism of the car be encased for protection against dust, abrasive substances and destructive accumulations, a single housing containing practically all the moving parts of the engine, the flywheel, clutch and the transmission. This assembly is in every sense a unit. It is so constructed that it is in every way accessible and it is possible to remove it from the chassis hy removing four bolts and hoisting it out. It can be taken from the chassis and another unit replaced and connected by two men in an hour and a half, perhaps in less time. It is entirely practicable for a spare power plant unit to be kent for emergencies and should it he necessary at any time to do so it may replace that in a chassis and the cab continued in use while work is progressing on the one removed

The casing is one of the most important features of the design. It is sectional, of aiuminum castings, and any one of these sections may be removed to examine or work on any part. To illustrate, the engine case or base proper consists of an upper section to which the cylinders are bolted, a bottom section and a base or bottom plate, the upper section carrying the front of the case proper. The bottom section forms the bottom of the housing for the flywheel and clutch. Itack of these is the bottom section of the transmission case. Above the rear extension of the lower section is the top section of the flywheel and clutch housing and in this is an inspection plate or handhole. Back of this is the top half of the transmission case, in which is also an inspection plate. Boilted to the front of the engine case is a case or cover for the timing gears. The different compartments are entirely separate and apart from The case, though in sections, is exceedingly strong and it is comparatively light and is stiffened by the transverse webs and flanges. All of the joints are lapped

so there are no weaknesses in the design. The case is designed so that by the removal of a few holts any moving part may be inspected, examined or worked on without dismantling the motor, which is an exceedingly important feature, and no adjustment need be disturbed

To illustrate possibilities, the timing gear casing may be taken off and the engine operated, showing the time gears in operation, the condition of all the forward bearings, and state of the engine governor. By removal of the bottom plate every main bearing can be examined, the condition of the camshaft bearings and the hig end bearings of the connecting rods seen, and the pistons and connecting rods may be removed entirely and work performed upon them. In this manner, too, the cylinders may be cleaned of carbon from below in a manner quite as thorough as if they were removed from the case. By removing the cans from the big ends of the connecting rods the rods and pistons may be dropped out and cleaned, the rings examined and the condition of the wristpins seen. The bases of the cylinders are machined to fit into the openings in the case and the fit is accurate, this affording a better anchorage, and the cylinder bore expands at an angle at the bottom for



of Holding the Water Jacket Caps, the Water Ontlet Manifold Staffing Baxes, the Low Wristpin, the Rings and Oil Chamber of the Pinton, the Valve and the Valve Operating Mechanism.

a half inch, this permitting a piston and its rings to be pushed up into a cylinder without difficulty, the rings contracting to the cylinder diameter under comparatively slight pressure.

There is another even more convenient manner of performing such work which will be described in connection with the mounting of the motor.

The engine case is given a maximum strength with a minimum weight of metal by the bridge design within the assembly. It is protected against stresses by its suspension in the sub-frame. It cannot be twisted or distorted or the shafts surung or misaligned through any legitimate use, and nothing short of complete wrecking of the vehicle would materially affect the mechanism

The evilladers selected for the motor are cast singly, this form of construction being chosen for a number of reasons, all of which are valid. These might be summarized thus: The single-cylinder unit is first of all the cheapest from a manufacturing point of view, this meaning the least cost,

but it is also possible to secure uniformity of wall thick - 1000 C

ness (an essential for efficient operation), to have the water jackets completely encircle the cylinders, to thoroughly clear the water spaces of core, to later on clean them of scale and deposits that might reduce radiation, to economize in machining and finishing, and to minimize expense if it is necessary to replace a cylinder. The cylinders are cast with a wide opening at the centre of the head which is covered with a plate secured by a nut through which the shank of the compression relief cock passes to anchorage in the inner cylinder head wall. This opening makes possible removal of core and deposits and examination of and repair of the cylinders under certain conditions that would mean replacement with any other design. Where a damaged cylinder is by no means a remote possibility the dusi cylinder unit or the en bloc design would mean a decidedly larger expense for replacement. With the water tacket completely about the cylinder the cooling is made more effective, a very potent element in continued service of a car.

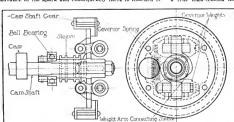
The head is of the T form with the intake at the left side and the exhaust at the right. The design is the most practical for any cah in that it permits the use of a double set of spark plugs for ignition, each plug being located in the head of the valve pocket directly above the valve. The two plugs are fired simultaneously in each cylinder, this insuring a much more rapid combustion of the xas and naturally a greater expansive force from the explosion of the charge. This form of ignition does not require so great advance of the spark and consequently there is lessender rereference has been made were in January of last year before the Society of Automobile Engineers on the dynamometer of the Automobile Club of America. gine with the single spark ignition reached 24 horsepower at 1750 revolutions, which was the maximum obtained, there being a reduction in power delivery above that of speed. With double ignition and no more change than simply adding the second set of spark plugs to the engine it was found that it delivered 24 horsepower at 1500 revolutions, under exactly the same conditions. The power was increased to 28 horsepower at 1950 revolutions. The extreme gain absolutely established was approximately 16 per cent. It will be seen that this means practically a gain of one horsepower for every six, or taking the motor under its A. L. A. M. rating (20,17) with this form of ignition on the basis of the tests it ought to develop 23.39, a very material increase of power. This additional power is a substantial reason why this form of ignition has been adopted for this can motor, especially as there is no increased consumption of fuel. As the ignition means simply one more set of wires from the magneto and one more set of spark piugs it will be seen that there are no complications. sides all this there is the added protection from failure of a apark plug, the breaking of a secondary wire, or any other probable defect that might seriously impair the efficiency of the engine. The ignition current is supplied by a Bosch magneto designed for the double spark system, this being a true high-tension instrument.

The form of the cylinder with its relation to water jacketing and radiation has been briefly mentloned. The water lackets are large and the water is circulated through a flanged tube radiator by a positive pump. This type of cooler is advised as it is not susceptible to serious damage should it be frozen and it may be easily repaired should it be so damaged. The water passages are large and the water is circulated freely. There is less possibility of organic deposits accumulating in the hottom of the radiator from the heating of the water. The water is forced from the radiator by the pump to a manifold extending along the cylinder heads and connecting with the water jackets directly above the exhaust valves.

Furth one Motor. The water is injected across the facket of the exhaust valves at an angle that directs the flow to the bottom of the water jacket at the opoposite allo of the cylinder where it is turned to either side and after circulating about the base of the jacket it flows upward to the upper portion of the chamber and is forced out to the radiator through a manifold with connections with easy current to insure a free movement of the

The plates covering the openings in the cylinder heads earry the connections for the water outler manifold and the connection is made by the manifold tabling set into stuffing boxes, this giving a water tight but flexible joint. The radiator end of this manifold is similarly connected with the radiator and there is similar feetbility of this joint. This eliminates all rubber tubing with the sources of trouble from deterioration, the circulation of the water is positive and certain, while the water piping can be disconnected with the greatest case. Any possible movement of the mowith the structure of the control of the control of the control of the control of the conneces of the other forms of connection.

The motor is lubricated by a combination of the force feed by a year driven pump and splash. The bottom of the crankrase is divided by the webs into four compartments and below the base of the rear compartment, formed in the housing is the reservoir for the oil. There are drainage holes in the webs and in the division so the oil always fills the reservoir and is maintained at a predetermined 0.000 [8].



Governor of the Pox Cub Motor, Which is Contained Within the Campbuff Genr and Oper-

tes a Sicere Silding on the Shaft, Controlling the Supply of Fuel to the Motor, sistance against the compression stroke, and with the firing when the piston is nearest top centre greater power is developed. With this design it is possible to use a thinner and more rapid hurning mixture, to economize in fuel and lubricant, and to produce results that have been established as practical in every way. It will not be disputed that each charge of gas of stated proportions has a definite heat or power value and the utilization of this power depends upon the design of the motor. It can be stated that much of the heat value of the mixture is lost through incomplete combustion and where combustion can be improved it is obvious there is a saving. Theoretically the time to fully energize the power stroke is when the piston is exactly at top centre and ready for the downward movement. Any power exerted upon the piston before exact top centre must be overcome by the power stored in the flywheel momentum and is manifestly lost, while if not exerted at top centre the expansive force is reduced in proportion to increase of combustion space by the downward piston movement over the combustion head area. The maximum of power development is nearest realized by the use of the double ignition system.

As an illustration of the strength of this claim and as an example of how important is the isnilion system of motors for power vehicles it is significant that in practical tests the double spark system has been proven to develop 16 per cent. more horse-power from the same motor than was realized by the single spark system. The tests to which level in the compartments when the engine is at rest. Driven by the injet camshaft at the rear of the motor is the numn which is installed in the reservoir and can be reached from the outside of the engine case. This nums draws the oil from the reservoir and forces it through large tubing to points above the main bearings whence it flows over the bearings and into the compartments into which the crankpins and big ends of the connecting rods sween, The oil is also forced through the forward main bearing into the Uming gearcase and thence is distributed by sniash over the timing gears. Stuffing boxes prevent the oil working out of the timing gearcase around the main shaft end and at the rear of the engine case, these being provided with drainage into the forward and rear compartments so that any excess inbricant is siphoned from the stuffing boxes. The caps and bearings of the connecting rod hig ends are drilled for a free circulation of oil about the crankpins. As will be obvious the oil accumulates in the channels of the hall bearings and there is always a sufficient volume of oil in these bearings.

The lower ends of the pistons when at the lowest point in the cylinders are below the base of the cylinders. wristoins are set a little above the exact centre of the pistons to remove the wristpin bearing as far from the head as is possible, where the heat is not as intense and the wristpin lubrication will be the most effective. This minimizes the side thrust of the piston on the cylinder walls as well. The pistons carry six rings, four above and two below the wristpin bearings, and between the ring groups the piston is machined slightly smaller, this space filling and carrying a volume of oil when the engine is in motion that constantly subriences the walls of both cylinders and pistons. The six rings insure a higher compression in the expansion chamber and steady the piston in its movement, there being no possibility of violent contact of the piston against the cylinder wail under any condition of operation.

The valve action is unconventional in that there is a spring fitting that constantly maintains the nushrods in contact with the cams, minimizing paise and insuring against undue wear. The cams are retained on the camshafts by collars. The pushrod guides are screwed into the engine case and are retained firmly by keys. In these guides are the pushrods which are hollow sleeves in the lower ends of which are hardened steel rollers or wheels. The roller shafts mesh into siots in the lower section of the guides, which prevent turning. On top of the guides are caps through which the pushrods rise and fail and at the head of the pushreds are adjusting nuts by which the clearance is established. The valves are of nickel steel and the stems of the same material. The pushrods carry collars and between these collars and the cap of the guides, surrounding the rods, are spiral springs which force the rods downward with the release of the cams. The action of the pushrods is positive and there is always abundant lubrication.

Back of the engine case is the case containing the flywheel and clutch assembly. There is a recess in the rear web of the case into which the rear main bearing is seated. and against this is a large recessed coliar that contains the rear stuffing box. The clutch is of the cone type with the spring retained between the web of the flywheel and the cintch member, the flywheel face being divided for the insertion of the clutching member. This member is screwed on to the end of the coupling shaft and locked firmly. The ciutch is so designed that hy unscrewing the coupling shaft and two retaining bolts of the flywheel the clutching member may be removed from the case after the removal of the upper half of the clutch easing. The removal can be performed in an extremely short time without in any way disturbing any other of the mechanism. This clutch assembly has a ball thrust bearing to sustain the clutch spring pressure and another half bearing to minimize friction between the axle and the fork lever by which the clutch is actuated The crankshaft extension is removable by means of a special wrench which fixes the ciutching member so that the flywheel may be turned. It will be noted that the connecting movement of the clutch when engaging is backward from the motor against the angle of the inside of the flywheel. One of the advantages of this design is that

of modifying the oscillatory movement of the motor shaft and causing a softer motion of the transmission during the period of clutching. This is accomplished through the action of the lever and the expansion of the ciutch spring. This oscillatory movement of a shaft is noticeable with a dynamo or electric motor and as a gasoline engine is driven by a comparatively irregular force this vibration of the shaft is propounced. This ciutch is so effective that a properly designed and assembled car may be started by it on any of the different speed gears and on any grade as softly and flexibly as can be a steam or electric vehicle. It is apparent that this manner of clutching materially reduces the wear upon any of the transmission members as well as making for the increased comfort of the passengers. The clutch and flywheel are contained in a housing that is oil and dust proof and there should be none of the causes of trouble that may be met with in other forms of construction. There can be no question as to the accessibility of the design.

The four-speed transmission has the highly important feature that it is possible to change from one speed gear to the other without passing through the gears between the two ratios. There is also the simplicity of movement of the shifting lever. There is an automatic brake attached to the clutch to prevent spinning in sear changing, which minimizes the wear upon the gears when changing speeds, while the clutch is energied. On the extension of the transmission shaft is the service brake, which is operated by a foot pedal.

The control levers are in the centre of the chassis at the right of the driver, and these are mounted on the transmission assembly, there being no connection with the chassis frame side member, as is the customary form of design. This makes it possible to secure the true form of three point suspension that has been given this assembly. The engine case is cast with a wide finance at either side that serves to carry it and the citted and transmission perfectly anchored on the sub-frame, this finance forming a complete devk about the motor and protecting it against dust, sterr, and or dirt that might be thrown from the surface of the road. No drip pan is necessary.

The sub-frame is of heavy tube and it follows the aides of the assembly from the front to the rear. The forward end of this frame is mounted on a ball joint carried on the forward member of the classis frame and at the rear end of the frame is a sleeve through which is passed a tuberound of the frame of the frame is a sleeve through which is passed a tubetubesis frame.

(To Be Continued,)

GAINS CONTROL OF UNIVERSAL.

Annoncement Is made from Detroit that Howard Walton of New York City has acquired full control of the Universal Motor Truck Company of the former city, and that a new concern will be organized with plans for a general enlargement of the business. The Universal company was formed about a year ago with capital of \$35,000. It is unformed that where the application of the Universal truck, will remain with the new owner as chief engineer and designer.

SPECIAL SHOW FOR PITTSBURG.

Following out the plan adopted by the Pittsburg Automobile Design? Association hast year, a special week will be devoted to commercial vehicles in its show at the languages tracking, Feb. 3-10. Numerous new lines are being represented in this city this season, and us anticipated that the showing will be larger than in 1911. It will be remembered that Pittsburg was the first city, outside of New Yark and Chiego, too hold a separate truck show.

"THE MOTOR VEHICLE FOR CITY AND STATE."

Discussion of Economies of Power Wagons for Urban and Interurban Transportation by Hayden Eames, General Manager of the Studebaker Corporation, Before the Boston Electric Vehicle Club.

THE subject of arban and interurban transportation by observing an experience of the transportation of the utility of the electric type, was discussed at length by Hayden Earney, general manager of the Studebaker Corporation, at a banquet given by the Electric Vehiche Ciub of Booton to federal, state and municipal representatives located in Booton. The banquet, given at the City Chiu, was presided over by William H. Blood, Jr., president of the Electrical Vehicle Association of America as chartman, and Lafke Vredenburg as toastmaster. Mr. Eames' address was given as "The Motor Vehicle for City and State." He said no part:

It seems perfectly ridiculous at this late day to come here and undertake to tell this gathering much about the electric vehicle or any other form of motor vehicle. You will have noticed that I am supposed to speak here tonight

canal. You all know that American speculators pronounced it to be impracticable. The railway freights were so high on account of short baul and frequent handling. But today it is not an objectionable thing.

As a result of this method of transportation Europe is away silend of us not only in transportation, but also in highway spikeep. They found that the automobile and the horse together land about the same effect on the highway as a pic kaxe and an air blast. The horse did the pickaxing and the automobile did the air blasting. It was found that the roads gave way much more rapidly than before. I underproblem has been solved, but in a to how far rhey lake gone la Kurope I do not know. The whole thing turns on meeting that particular condition. It does not apply much to



Hinner by Electric Vehicle Club to Federal, State and Municipal Representatives Stationed in Boston, at the City Club's Banone) Hall.

of the motor vehicle in its application to the city and the etate. Now it is just in such classification as this in which most of the matakes on the subject of the motor vehicle have been made. Inefficient brevity versus undue qualification have obscured the main issue. There is the urban and the interaction service. You often hear the man on the street making an application of something to motor vagous when that belongs only to its application to city service or to interaction service. It is going to be difficult in this and under qualification. Hardly any statement you can make resarding the motor vehicle is unqualifiedly or strictby true, and so I shall have to ask you to take to no fath.

One of the reasons Europe has helped us so much less in power wagons than in the matter of pleasure vehicles lies in the fart that recent interest in Europe has centred upon interarban transportation. The character of their roads and their high freight rate contribute a great deal to that. As long ago as 1941 the records in their amount ransportation in Europe had a high degree of specialization and thoroughness. Appendix of the properties of the properties one und a half peace a ton a mile, which was extremely good at that time. One example is the Manchester ship city use. There does not seem to be much doubt--and it is growing now in a more or less tentative manner in the West —that transportation from rail heads and way stations by automobiles is going to open up new territory. Possibilities in that direction are being recognized in Europe, and were recognized a good while aco. in 1888 the underwriters of the lefeatur railway system found that by the migration of the lefeatur railway system found that by the migration of of Russia, the underwriters in plan become unprofitable. They ransacked the world to find out how they could put automobiles into that territory.

One of the things which the littlish have had to encounter, and which this government has had to encounter in its laterarban transportation was the strength of bridges. In England they dodged that issue by adding the seven-not lorry and the three-ton track. In that way they got rid of individual units below that for which the hridge was constructed. The span style of bridges was found to be the lost, and for military purposes this style of bridge is very good. For military unest the weight of the gan limber is ensured to the style of the style o

German authorities have come out directly, saying that they have no hope of using automobile company wagons or any wagons with the treops. They limit the utility of power wagons to transportation and rail head camps. One trouble of the power wagons to transportation and rail head camps. One trouble of the power wagons to that as a rule it is not designed for beginning next month, and for the first time to the beginning next month, and for the first time of the first time of the property of this country will be made the first experiments in automobile company wagons. This is quite a despitator, and is being watched with a good deal of attention. It is the first time that any military company wagons despined for the purpose will be used, but they have not good self-net for the purpose will be used, but they have not good so it is not be south. Those wagons will be run from Indianapolis to the South.

Now in such a comprehensive subject as this I have to speak carefully. I want to differentiate the urban from the interurban conditions, and to deal with the economic conditions as well as with the effect of freight rates. You can easily see without much discussion what that would be. It is a question of having a haul short enough so that the railway does not get the advantage of liferquent handling—longer than the horse could possibly be considered for. But it is all secondary. One of the differences between the European truck and ours is that of the design of the wagon. I do not hesitate to say that there is not any power wagon today that is designed with dislater teference to economic use, for instance. The ordinary design, such as the electric company makes, comes searces, but the gas awagons do not

come near the urban requirements.

You will get the idea when I cail your attention to the difficulty of the detachment of units and the matter of mechanism. A five-ten truck costs about \$4,000 to the purchaser. He has to have super trucks. The average sumber of spares in Lendon was 30 out of every 100, and those lumps of sugar with files on them. The floor of the machine shop looked like a gigantic watchmaker's bench. The secret is to have the units detachable, as in done in the electric vehicles, and that makes one of the cogent reasons for its superiority. Those things are not developed in Europe, partly because of the interurban service and partially wages is also a fact.

But it is the urban delivery that really interests us. There are very few parts of the world where the roads are good enough to make interurban service of sufficient interest. What is very true about interurban service is frequently untrue about a trans acritice. There is a creat deal too that most people believe. A man will say, "Yes, I know how that takes place," but in many cases you have too say, "No, it doesn't take place." And that seems to settle liseft. The actual cost of an installation today can be reck-oned without routhe, for there are ample data, and where these estimates have been made synthetically and tried out that so-called nuestion is a foolib question.

The day has gone by when the old-time idea of a "practical man" was a matter of admiration. That is, I mean of a practical man was a matter of admiration. That is, I mean of a practical man who has no other knowledge than that which has gone into his own life. You have to apply other people's knowledge as well as your own, and if you adopt that principle I unbesitatingly say that certain estimates. I am going to read to you are as absolutely certain as if they had been extually done. There is not a single item among them that has had to be cast out in the slightest degree. The majority of articles received from time to time in the mazarines and technical papers are written by people who have just waked up. They do not know more than the first notion about this thing, what information there is about it, and how other people have studied.

Intuless men have not awakened to the possibilities of the electric whether. They have not watered its progress, nor do they realize how economical it is. The best proved of this was contained in a remark which was addressed to me today by a busiless friend who stopped me on the street and naked me what I was going to do in the evening. I said I was going out to dinner. "Can't you shake it?" he asked. "No." I said, "I have an address to deliver." "What is it.

about?" he asked. "It is on motor vehicles and the methods of transportation." "Well," said my friend as he gree entusiastic over the electric commercial vehicle, "the power wagon is going to come." Now these people who say that it is going to come overlook the fact that it has been coming for 15 years past, that it is now here and has been here. Yet my friend had only just begun to realize it. The horse-has been at a dighted tisdastinatege for 16 years past.

In 1901 and 1902 electric trucks were being produced and were transporting freight more economically—considerably more economically—considerably more economically—than horses. The first automobiles developed as steam webles were followed in this country by the electric. Then the electric versus gasoline question began to occupy everyone's mind. There is not much of than now. It boils itself down to a question of acchanism and of drivers' wages. There isn't a doubt that the majnitude of the electric is much less than that of the agas driven car, and the electric has a tremendous advantage in the larger autions. The storage battery is improved greatly, but it was better than the horse than the horse than the larger in the larger in the storage battery is improved greatly, but it was better than the horse than the horse than the larger in the larg

I remember that one great express company put in a lot of batteries and they were continually fooling themselves. The president of one big express company was stampeted by the tants into putting in some selectric vehicies in undue baste. They were shipped to a northern city. The batteries exent out with no hold down and the freight was shipped to this station the same time as the vehicles. The drivers took the vehicles off the freight cars and then run them through the streets until the batteries ran out and then the drivers walked in. Those batteries gave out soon, and then came a man to replace the batteries. They had

After this account had been cleared I walked into the man's office, and the mere sight of me almost drove him man's office, and the mere sight of me almost drove him into a ft. He seemed to think I was to himme. At the end of the year I stopped there again and asked him how the him stallation was serting on. He said, "I hate to say so, but It has cost us fees han we had act saids for the horses." He was deceived by that one experience, but they had to put In was one of the heart I know. There is the differentiation between the obliguous and the relationships as the differentiation between the obliguous and the relationships as the differentiation between the obliguous and the relationships as the relation between the obliguous and the relationships.

The electric vehicle has a tremendous advantage in large cities, as it moves quietly and is able to get to a designated point in a certain time—much less time in fact than a horse-could cover the same distance. Pleture to yourselves a London omnibus outfit and what gasoline vehicles require. With a gasoline station, no matter how serviceable or how good your equipment is, you have got to have a repair shop, and there must be a lot of mechanics in it. Now in an electric installation with 12 vehicles in it there never was a time when 1 saw more than three men there, and at no time out of the 20 occasions on which I visited it, did i see more than one wagon out of commission.

There is not the least doubt that the maintenance of electric vehicles is very much less than that of the gasoline, electric vehicles. You can get more speed out of the gasoline, but for true, burprose this is not an advantage in the most congested parts of our city and under other conditions. I doubt if the streets will ever be clear enough to permit IT. There has been a great improvement in the traffic of streets. The limits imposed by the present construction of streets might seem to be limits from intersections, and I don't see how that interference is going to be sixen as to deprive the electric vehicle of its advantage in the matter of maintenance.

Comparisons are misleading on account of misrating. Nearly all electric vehicles have been rated on the basis, roughly speaking, of the life of the wagon. The life of the wagon will be compared at twice the weight of the load. That will develop the result for horse wagons. They are setting closer and closer together, but many comparisons made on that hashs are erroreous.

There is one point very frequently overlooked in power ones. Not only will appeal save travel, but increase in size will save travel. Time conditions are limited by overexisting conditions. But that problem is in a fair way of solution. It would not superise me within the next 18

months to see electric trucks as high as 10 tons travelling eight or 10 miles an hour. In view of this, street conditions will have to be considered to meet this. These trucks will be hought irrespective of any notions people may now have about them. A great many people will be getting themselves on this subject in the very opposite direction from what they are today. They will be buying blindfolded as it were, and the people concerned in municipal affairs and in the condition of the street would better look those conditions in the face.

One of the difficuities in the introduction of trucks has heen that very fact of the relation between the speeds of trucks and their weight and size. I remember an argument we once had with a western man. We succeeded after a laborious discussion, and by the application of a little ordinary commonsense in convincing him, it took us nearly two months to convince this western man that he wanted a

wagon twice as large.

Of course most of this is very general. Some of the facts I am going to give you have been taken from reports which you doubtiess have read. Up to Sept. 1, 1911, \$10,000,000 worth of electrical trucks were purchased in this country. There are said to he 1000 gasoline trucks, registration trucks, in New York. Two and a half million dollars' worth were bought last year up to Sept. 1. We figure that it will take about 76,500 kilowatts to deliver the retail freight annually taken off the railways of this city, jet alone other freight. About 3,000,000 power wagons will he required for this country. About 16 times as much freight is handled on wagons in this country as on railways, and that includes rehandling.

There is a great deal of hallucination abroad on the subject of the low efficiency of the electric vehicle. The low deficiency runs from 39 to 73, and the electric vehicles run about 80 per cent. There is nothing in all this talk about the heaviness of the electric vehicle. The electric vehicle is no heavier for the service it is called upon to perform than

is the gasoline vehicle.

I have here some particulars of installations that have been worked out synthetically. Some of these are actually in use, and some are not. One large horse and wagon installation by a large packing company cost about \$194,000, and the cost of the electric machines was \$166,000. The horse expense amounted to \$136,600 and the machine expense was only \$113,000, including depreciation and interest on investment, and it showed an annual saving of \$23.-600. Another aimilar packing house more favorably situated showed a saving of \$15,000 a year. Such results as these are all hullt up synthetically, and the allowances for battery maintenance are all excessive. This has been confirmed not only by actual application in some of these cases, but by actual application elsewhere.

One of the most profitable installations I know of is that of A. I. Piercy in New York. The manufacturer who sold him vehicles made a contract with him by which a certain fixed charge was to be made provided the manufacturer had power to select the station superintendent. Mr. Plercy could not appoint the superintendent without the consent of the manufacturer. Mr. Plercy was to pay the manufacturer back one-half of that figure manufactured in excess over that figure. Ten months ago they had been going 2.5 years, and at no time had any vehicle exceeded onehalf the estimate upon which the installation was based.

Anybody hearing that kind of a story would immediately ask why electric vehicles were not introduced a iong What was the trouble? The trouble was the time ago. same as in the case of every invention ever introduced anywhere in the world. Mr. Blood, at the meeting in New York on Oct. 10 said it was inertla, and that is about as good a word for it as any other. it is perfectly astonishing to see how the human mind works on this question. It has a sort of positive kind of inertia.

I remember the first electric vehicle with which I was concerned. A local carriage maker put up the body of it. When it came to the work it had a whip socket on the dasher. "What is the whip socket doing here?" i asked. "Why, we have always put them on," was the reply. How perfectly fooilah it sounds.

Suppose a man came into your office with an invention,

saying: "I have the most wonderful motor you ever saw, It has no handles, no steering gear. All you have to do la to speak to it and it goes or stops." You would say that was wonderful. The man adds: "To be sure, it goes sidewise when you don't expect, and it turns around sharp, stops without notice and changes its speed." You would say: "Good bye. I don't want anything to do with that invention." That is what the horse does,

Here is another hallucination. There is a good deal of mathematics about this: One of the commonest things you get from the habitual horse user is the statement that onethird or one-half of your time is standing still, and you have to save all your time on the other half. The whole situation is speeded up to some extent, and the ideal time comes into the power wagon more than it does into the horse wagon. You make allowance for the poor heast to get there, but you have to allow for his average condition. You speed the whole thing up to meet that condition. As soon as you introduce the power wagon you put that all out. In the case of a New York express company, when it ran horse vehicles they stood idje 35 per cent, of the time; when they used power wagons they stood idje only 22 per cent, of the time. You have got to use the new tool. It has been the whip socket and the sharp shoeing husiness that has prevented people from taking advantage of that spiendld economy.

I remember the case of a man in St. Louis who delivered packages from a dry goods store. He never sorted the packages until after they had been put into the wagon, and he took advantage of the idleness of the horse to take the packages out and then sort them on the curb. When that dry goods store put power wagons in it was another thing. Then he awoke to the new facilities. All of you must be

familiar with that attitude.

I might mention here the municipal ordinances that make the taxicab in this country impossible. People amusedly try to explain why they don't pay. The real explanation lies in the fact of the non-paying mileage which in London is 12.5 per cent, of the total mileage. The non-paying mileage in Phliadelphia and New York is 55 per cent., and the reason is that the particular form of ordinance in relation to the arrangement of can stands is such as to enforce that dead mileage. That is simply another example of the whip socket. You remember that a year or so ago there was a great deal of agitation regarding what the automobile was doing and how it was ruining the finances of this country. We all know what nonsense that was,

THE MOTOR CAR INDUSTRY.

The December issue of "The Gramm," a monthly publication devoted to the interests of the Gramm Motor Truck Company, Lima, O., contains an interesting article by B. A. Gramm entitled "The Motor Car Industry." It presente pertinent facts relative to the commercial vehicle and gives some idea of the numerous machines in service as well as the jarge number of horse drawn vehicles replaced: company also issued a special number devoted to its Canadian interests.

LUMBER MEN TO BUILD TRUCKS.

Eddy Bros., a millionaire lumber concern in Bay City. Mich., is said to have become interested in the purchase of the Owosso Motor Company, Owosso, Mich., and it is understood that if the plan materializes the business will be removed to Bay City, where ampie capital will be forthcoming to produce light delivery wagons in large numbers during the coming season.

KANSAS CITY'S SHOW PLANS.

Kansas City is in the centre of a section in which it claims there are more cars soid annually than in any other locality in the United States. Insamuch as the two dealers' associations have been amalgamated this year, it is anticlusted that the display of Feb, 12-19 will be of large importance in the industry. Special provision has been made for the showing of commercial vehicles.



BRIEF NEWS OF MANUFACTURER

- AND THE TRADE -

The H. F. Board Motor Truck Corporation, Alexandria, Va., has eteated a preferred stock of \$25,000

The White Company, Pleveland, O., announces that James A. Harns, Jr., of the sales department, has been appointed advertising manager.

The J. I. Case Threshing Machine Company of Racine, Wis. has opened a New York City branch at 1860 Broadway (C. A. Lewellen is In charge.

The American Elastic Wheel Compuny, New York City Incohen Incorporated for \$50,000. The Incorporators include C. Ferset, F. Corst and F. P. Wird.

The Moran vato Sules Company, Grand Rapids, Mich., has been appointed agent for the Velle commercial vehicles by the

The Antomobile (unitum tempony of Lynn, Mass, was incorporated recently for \$10,000. The Incorporatory Include Elben E, Philips, Partice Is Therland and James J Liffin.

The Fewin M. Jennings Cumpany, Bridgeport, Conn., has been appointed agent for the Aleo tracks, made by the Amerlean Legennolive Company of New York City and Providence.

The Hydraulic Major Vehicle Company, Milwaukee, Wir. was incorporated recently for \$15,000. The incorporators include Calvin Stewart, August Ballzer, W. M. Stewart and W. S. Brown.

R. S. de Wilklewier has resigned from the Motor Elegineering & Sales Company of New York to accept a position in the track department of the Peetless Motor Car Company of New York



New Factory of the Federal Mator Truck Company at Detcolt, Which Was Formerly tecapled by the Van Dyke Mator Cac Company,

Chicago branch of the Velic Motor Vehicle Company, Moline, III

The Hartford Suspension Company, Jersey City, N. J., has opened a factory branch at 1524 Grand avenue, Kausas City Henry Roemer is manager.

The Leighton & Hancock Mater Track Company, 16 I. Walnut street, Columbus, O. has been appointed ugent for the Sternberg commercial vehicles.

The Columbia Taxleab Company, Evansyille, Ind., has been incorporated for \$10,000. If E. Hulseman, W. Wheeler and A. C. Mathias are rained as directures

The Nuse Wagan A Vatomobile Company has been incorporated at Newark, N. J., for \$50,000. The incorporators were Fred Nuse, Louis Nuse and Fred Nuse, 3r.

The Automobile Hern & Pump Company of Hoston was in: Corporated recently for \$25,000 Authory J Sun is presided and Joseph Payne of Malden, Mass, treasurer

The General Motors Track Company, Detroit, has formed a service department in connection with the selling organization and this branch will be in charge of T P Myers.

The Penna Motor OH Company, Los Angeles, Cal., has been incorporated for \$25,000 J. P. Smith, Joseph A. G. Brown and M. B. Armstrong are named as the incorporations

The Randolph Motor Truck Company of Delaware was incorporated recently for 1200,000. The Incorporators include It to Compilian, Brooklyn, N. Y., and Welcome W. Bender, New York 200.

The G. A. R. Motor Company of Platafield, N. J., 848 been furnity-orated for \$80,000 by A. A. Reed, E. J. Kuhne, H. G. Unier, G. Beinberg and H. B. Uhler, Jr. The convern will manufacture motors.

The Powell Engine Corporation, 12 Lincoln place, Brooklyn, N. N., will place a 15-ron track upon the nurket shortly. It will be propolled by a four-extinder unit power plant located inder the driver's weal.

The Centaur Manufacturing Company, Buffulo N. V. was incorporated recently for fill-ood to manufacture motor cat appliances. The Brouporators bedude A. Schmidt, J. E. Hatts and Berlin F. Schmidt

The Velle Boston Branch has respectived Arthur G. Beharrell as agent for Lowell Mass. The latter will maintain a service station, a feature of the policy of the Velle Motor Velli cle Campany, Modine III.

The Mercury Manufacturing Company, Chicago received to order for 12 trucks recently from a laundry in that city within experimented with communical vibrals of different types before about the control of Welch & Sathergren, Worcester Mass., has opened a show and salesroom at 673 Main street and in addition to the pleasure car is handling the Peerless truck, made by the Peerless Motor Car Company of Cleveland, O.

The Howe Motar Manufacturing Company has been incorporated for \$500,000 at Comden, N. J. The incorporators consist of Charles D. Resore, Marion Lambert, Florence M. Caskill, all of 104 Market street, Canaden.

The Firestone Tire & Rubber Campany, Akron, O., has opened a factory branch at Italias, Tex., at 1521 Commerce street. It is in charge of P. H. Tolbut, who for many years represented the company as a travelling subsymmetry.

The Findelsen & Kropf Manafacturing Company, Chicago, has made the following additions to its list of agencies: Ballou & Wright, & Sixth street, Portland, tire.; Brawne & Leavy, iteal Estate Bank building, Savannah, ita.; Joseph Woodwell Company, 201 Wood street, Pittsburg, Petur.

The Morse-Readlo tuto Company, Springfield, Mass., which was incorporated recently, will erect a five-story brick and steel garage on liwight and Chestaut streets and will maintain a service station for a line of G. M. C. trucks for which the company is agent.

The Lauth-Jucrgeus Motor Cur Cumpany, Fremont, O., has completed plans for a new building 250 by 60 feet which is to be utilized for assembling and body building. Another is are

The International Notar Truck Compuny, New York City, has removed its offices and solernouns from 30 Church street to Broadway and \$2th street, where four floors of the Benarest building with 6c milits of Indiert Putton and II, D. Weston of the soles arganization of the composity will establish quarters

The Hemy Electric Company, Anderson, Ind., well known maker of likiting and lightino singularities, amounters the addition of a new service station and empty house at Patlias, which was not to the A. Friec, formerly or the New York City branch, and we have been confused with the Remy company, for several years.

The Newart & Univ. Meantertains Company, Chicaso, recently completed an addition to the large plant at a cost of 110,000. The new structure is being equipped with moderat machiners and will be sufflind for the mountarium of drain sunctors. In the accompanying Illustration is depicted the factory of the commany including the new building.

D. K. Moser, the president and one of the orientless of the American Instributing Company, Jackson, Mich. has accepted the position of sectoral schemanises of the control data that the control of the control of the control of the lifted with the automobile industry for the past 10 yars, having spreadless in the creduction and sale of sales, wheels, the control of the control of the control of the control of in the American Distributing Company,



Plunt of the Siewari & Clark Manufacturing Company, Chicago, Maker of Speedometers, Showing New Addition Constenced Recently,

structure will be erected in the spring to take care of the in-

The Kerosene Gas Producer Company, New York City, announces the opening of a sales office at 1926 Broadway of that city, where all communications in reference to the business of the Vulversal Oil Converier Company or the Kerosene Gas Producer Company should be sent.

The Swarson Meter Company, 5719 Wentworth avenue, Chleago, amountees that in addition to several lines of commercial vehicles it is specializing in beavy tracks, having received a large number of orders for this type of power wagon

James P. Evnas has been appointed advertising manager of the Leuler Motor Company of Detroit to succeed C. A. Embewish has been promoted in the position of soles manager. Mr. A. Emberson of the Company of the Company of the Company and was ethicated in Cherlin College and the University of Chicago.

The American Locomotive (imman), New York City and Problemey, B. I. announces that J. F. (Hroter has been placed in charge of its service department. He has been associated with the motor cor undustry since 1905, during which time he has filled many important positions with several well known

The Federal Notes Track Lompass, Detroll, makes of one-ton tracks, he partessed the land, buildinars, machinery, etc., of the Van Tyke-Moior Car Lompany, and the former concern will mave the moethney lind the new plant which it is outtimated will increase its production to about 1000 cars a year, to be supported to the continuous of the concern to the continuous of the continuous co

The banth-diseases, Motor for Company, Proposit, O. garnomiers the side of four motion and one two-ion tracks to Brinks, Express, Los Angeles, (*) which concern does a general express and transfer believes. The Glowing faves been appointed access "The Mittial Anto Company, Sulinta, Mirro, Los Angeles, 1941.

The states hato Supri) Commun, how been proopported at elekations, i.e., with a secretal of \$4.00m, the officers being as follows: President, b. P. Mer'lure; vice president, C. W. Payne; escretary, A. O. Wallaudi tressurer, E. P. Mer'lure This concern will do a whole-site husiness in motor car accessories, executing the Section of the Man, Minter-ord and Missouri, as well

GAS ANALYSIS INSTRUMENT.

Proper carburetion is one of the most important factors in the operation of an internal combustion engine, and unless the vaporizer he set properly there is a decrease in the efficiency of the power plant as well as trouble developed in the nature of carbon deposits. The common practise of setting a carburetor is to change the amount of fuel and air until the motor appears to run satisfactorily on the mixture and this is done regardless of the proper proportions, it may be that too much gasoline is being employed and that the excess is not being converted into energy. There are certain stated proportions of air and gasoline and these percentages have been determined after years of study and experimentation.

A device for analyzing the gas has been designed by Joseph W. Hays, combustion engineer, is manufactured and marketed by the Combustion Appliances Company, Rogers Park, Chicago, and is known as the Coapco special gas analysis instrument. It is mounted in a steel carrying case, having outside dimensions of 13 inches high, seven wide and less than three thick. It weighs less than 13 pounds and may be carried in any position without spilling the fluids utilized in its construction.

The operation is simple and the gases may be tested in iesa than a minute. The method of checking these is as follows: A short piece of gas pipe or brass tubing is inserted in the muffler or exhaust member and the instrument suspended. The motor is started and by pressing a build connected with the device a sample of gas is drawn in and conveyed to the registering tube, where the amount of carbon dioxide, carbon monoxide, etc., is noted easily. If the mix-

ture he not correct the carburetor is adjusted either for gas or air as the device indicates is necessary. Too much or little of either is noted readily and it is obvious that all guesswork in setting the vaporizer is eliminated.

If it be desired to make a combustion test upon the road. all that is necessary is to tap a cock into the muffler or exhaust pipe and connect the instrument by means of a rubber The former may then be taken into the tonneau and hose. samples taken while the car is in operation and at any speed and over all road conditions and grades. in addition to ensuring a correct mixture the device makes for economy as rich mixtures are instantly detected and considerable time saved in the garage in adjusting new or old carburetors.

ISSUES ANNIVERSARY NUMBER.

The Team Owners' Review, a publication devoted to the teaming, transferring and express trade, and which is published in Pittsburg, Penn., has issued an anniversary number which is neatly printed and bandsomely illustrated. it contains information pertinent to the transportation industry.

DEMOUNTABLE RIMS FAVORED.

That there is a growing tendency to fit demountable rims as a part of the regular equipment was noted at the recent shows in New York City. At the Grand Palace exhibit nearly 25 per cent, of the commercial vehicles shown were fitted with this type of rim and many of these were Firestones, made by the Firestone Tire & Rubber Company, Akron, O.

Two Big Shows in New York City Exhibits at Madhon Square Garden. Lange Company to Make Trucks..... Truck I bisplay at Grand Central Palace January General Vehicle Sales . British t'ars I'se t'oventry Chains West Awalts Chicago Show * Middle Plans for Boston's First Truck Show Toledo's Third Annual Display Providence.... then Air Effect for Provide Exhibit of Detroit Dealers Exhibit of Detroit Dealers. Two Buildings for Philadelphia... Will Handle Commer Trucks Lubricating the Commercial Car. Methods Which Secure Reorders, P. D. Wagoner *Methods Which Secure Recorders, P. D. wagoner Pritted Staten Tire Data... *La France Gasoline-Hydraulic Truck *Trucks Rellable," asys Willys *New Hazard Motor Catalogue... "New Hazard Motor Catalogue... "Facilitates Loading Lander... 1011 to Limit Truck Weights ... Practical Motor Truck pony respectively Baldwin Sectional Steel Truck Tite Hold Three-Day Convention Reports Good Trade Prospects. Kunx Trucks Replace Horses Adds Five Commers to Fleet. Metzger to Build One-Ton Truck ... Electric Vehicle Brevittes ... Department Notes *Removing Tires from Rusted Rims, Mechanical Notes, 118 *Ignition Timing, Mechanical Notes, Lining Up Chalus, Mechanical Notes, United Affects Gas Tank Pressure Kennedy Beads Months Kennedy Heads Alen Cost Bureau Progress Revealed by Shows, Editorial ... Service an Important Factor Editorial ... Service an Important Factor re-Meeting the Holy Problem, Datable . . .

Detailed Specifications of 1912 Models. *New Commercial Car Accessories St. Louis in Pelemary

Martin Tractor Hauls Coal Wagon.

TABLE	OF	CONTENTS.
	Page	Page
		Many Delivery Cars on Coast
		General Motors Has Neat Bulletin
	. 11	Luce Confers with Commission
	- 17	Further Discussion of Anti-Friction Bearings, Corre-
ce		spondence
		Calendar of Coming Events
		*Fox Public Service Motor Cab Design, Jaseph P. Fox., 135
	. 17	Gains Control of Universal
		Special Show for Pittsburg 141
		"The Motor Vehicle for City and State 142
	65	The Motor Car Industry
	5.5	Lumber Men to Butld Trucks
		Kansas t'lty Show Plans
	9.91	*Brief News of the Manufacturer and the Trade 145
	4.9	Gus Analysis Instrument
	35	Issues Anniversary Number 147
, Wagoner	541	Demountable Rims Favored

INDEX TO ADVEDTISEDS

Accessory and Garage Journal.	
Automobile Journal	1
Horne, Serymeer Company	
Couple-Gear Freight-Wheel Company.	1:
Decator Motor Car Company	
Eagle Oll & Supply Company	1:
Edison Storage Lattery Company	11
Pirestone Tire & Rubber Company	4-1
General Motors Truck Company	Cover
General Vehicle Company	Page
Goodyear Tire & Hubber Commons	6.
Haveline Dil Company	
Hazard Motor Manufacturing Company	
Hoffming & Co. S. Ltd	13
Kinnler-Remnell Company	14
Knex Attomobile Company .	1
Mais Motor Truck Company .	11
Marlorg Bros	11
McInivre Company, W 41 .	11
Mea Magneto .	1.1
Motz Tite & Rubber Company	11
Perfection Spring Company	11
Splittorf, Charles F	Cover
Sullivan Motor Car Company.	1 1
United States Tire Company .	
Victor Motor Truck Company	13
Western Motor Company .	14
White Company The	14

*Indicates and the is diffusioned

Undisputed Leadership in

Firestone

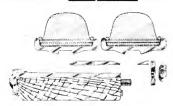
Leads Again at the Truck Shows

Has More Equipment Than Any Others at

the New York Shows, by a wide margin.

A complete line of truck tires for every type of car, size of load and condition of service on Removable and Non-Removable rims. Firestone Truck tires have led the industry from the very beginning in Accuracy of Design, Volume of Output and Quality of Tire. Undisputed leadership has particularly qualified the Firestone company to offer the only complete and fully proven line.





Single and dual Heavy Duty tire for resiliency. Economical in car up-keep. Old and S. A. E. standards. *Note:* Both dual tires can be taken off without removing the wheel.

Devoted to Motor Driven Business Vehicles of All Classes.

VOL. III.

PAWTUCKET, R. L. MARCH, 1912

THIRTY-FOUR NEW MODELS AT CHICAGO.

Many Western Manufacturers Make Initial Showing at This Display---Standard Construction Prevails, Though Novel Designs Are Presented--Attendance Exceeds Last Year.

SIDE from being the largest exhibition of commercial motor vehicles yet held by the industry the second annual separate showing of industrial transports in the Coliseum and First Regiment Armory at Chicago, Feb. 5-10, was of decided importance. There were 81 different makes on view, of which 74 were gasoline driven machines and seven electric. Thirty-four mannto turers were not represented at the shows in New York during the preceding month, and of these 32 plants are located in the

Middle West. The National Association of Antumobile M a nufacturers. under whose anspices the event was held. Lacfit no stone unturned to make this tic most represouthfully, shows ing of months trucks in the country, and Ober Street area of the enterprise was assured to generous resmense of the makers. The m a n agement. under the direction of S. A. Miles, was not providing the amortanity for making display, but earried on a

campaign which had its beginning jong before the 1911 show, which resulted in greatly augmenting the attendance upon this event.

The plan was in the nature of an educational campaign. in which a systematic correspondence was arranged between the committee in charge and the people of that section of which Chicago is the metropolitan commercial centre. Men in all walks of life were reached by carefully worded letters bringing out the particular benefits to be derived from the

use of industrial transports in the line of business with which they were connected. These contained arguments and facts based upon what has been accomplished in different sections of the country, under varied conditions, and the result was in effect a personal invitation to attend the show and study the subject at first hand by comparing the machines on display. That this plan was a success is indicated by the announcement that the total attendance during the week exceeded that during the week in 1911 by 40

per cent. The volume of business transacted was proportionately large. In the matter of decarations, the Chicago show has because recognized as the most elaborately staged of any American nutra mobile exhibition. Of course, this applies to the pleasure car display, stace that is held first but the same attractive setting is used for leth. This year. the Coliseum proper was so completely that even the a hera manage. ment was at a loss to give the scheme a dis-



Seems to the Collegem Haring Progress of Phicago's Commercial Car Show, Indicating Beauty of Decorative Scheme,

timitive name Accompanying photographs give a slight indication of its remarkable beauty

A mosaic palace is the term which contex nearest in describing it. The roof was a missive pointed arch, from which were somended three rows of innicial of sounce design and great size. I'nderneath, a wide main aisle divided the show spaces in half, those in turn being sub-divided by superstructures, suggesting immense clock towers surmounts (-()()() ed by small squared spaces with four projecting platforms carrying potted palms. On either side of these clock towers was a lower structure terminating in small turrets, also carrying potted plants.

The treatment of the balcony, where accessories were reshown, and the Coliseum Annex, was similar in design on not so elaborate in its execution. The First Regiment of Armory attligated some of the decorative features which did duty in the Coliseum last year. All told, the general effect was most hevildering at first.

It has been stated that there were 34 makes of machines on display which were not seen in New York. But one of these was electric. It follows that the electric car situation is not greatly changed as a result of the Chicago show. Reference is had particularly to those vehicles which have been arranged for public inspection in comparison with other makes.

With respect to the gasoline driven machines, it will prove of interest to add those shown at Uhicago with those seen in New York and attempt to arrive at some idea of the trend of design. Of course, it will be admitted that this of hood. Still other features will be noted herein

Perhaps one of the most notable results of the three each shows is the doption of the foreign policy with respect with the location of the motor elsewhere than under the hood. This may near that the power plant is under the floor, under the seat, in the cab, or with a hood so short as to prove almost negligible.

Not counting the two three-wheeled vehicles, there were 25 makes of gasoline ears at Madinos Square Garden, 22 at Grand Central Palace and 33 at Chicaso which were not seen at either of the other two shows. Of the 23 at the Garden 10 were with motors under the hood, 11 under the Goor, seat or ambeblips, and four in the cab. At the Palace, 18 were under the hood, and 14 elsewhere. Of the 33 new Irusks at Chicago, 18 were under the hood, 12 under the floor, etc., and three practically within the cab. In one or two cases the hood was so short as almost to bring these makes within the other classifications. This brings the total to 90 different manufacturers, who have decided this question as follows: Under the hood, 46; under the floor, etc., 37; in the cab, sevon. It should not be considered,

however, that this is an exact representation, since some makers still retain the hood with certain models, having adopted other locations with their newer productions only.

Closely ailied with the subject of motor location is that of placing the driver. While the New York show scemed to indicate a tendency toward the left hand drive, so-called, the results at the conclusion of the Chicago display do not seem to warrant this assumption. However, the percentage of trucks thus arranged is solficiently large to merit attention. Lighteen of the 25 makes shown at the Madison Square Garden were with right hand location of the driver, while seven showed the opposite to be true. At the Grand Central Palace, 18 were at the right and 14 at the left. Of the new makes at Chicago, 24 were the total of 90 again, 60 were with right and nine were left. Taking right hand drive and 30 with left



General View of the Unio Clour in Chicago Collseum, with Motor Trucks Disposed for

term is somewhat abused. In the main, motor trucks follow standard construction, much the same as do pleasure vehicles. The day of experimentation is not past, and it will be noted in a continuation of this discussion elsewhere that some new things were brought to light at Chleago.

It will be remembered that there were three worm driven trucks on display in New York. These were the Pierce-Arrow, which adopted this method of final drive a year ago, at the Madison Square Garden exhibit, and the Newark and Rowe at the Grand Central Palace, Chicago added three more—Hisir, Great Dain and Smith.

Among the friction driven machines at New York were noted: Carterear at the Garden, and Best, Commerce and Poss at the Paiace. The Great Dain, Service and Utility were added at Chicago.

Accessibility of the power plant has been worked out in a number of ways, as was explained with reference to the eastern displays. At least two more novelties were uncovered at the Coliseum. Two more trucks appeared with the foreign placing of the radiator and the Renault type The same rule applies as with the motor location, since some makers fit vehicles with either right or left hand drive, as desired, although in each such case, the maker has been listed as offering left hand drive in the above compilation. Thus, while the list shows one-third with left hand drive, this is not exactly warranted when the total production is taken into account.

Coming next to the matter of control levers, it will be seen that there exists considerable difference of opinion here as well. Of course, with the left hand placing of the driver, the levers must be taken away from the right side of the truck, although it does not follow necessarily that the levers will be operated with the left hand. When this is not the case, they must be located in the centre, and it is to be noted that some makers have adopted this plan, even though the driver is still retailed at the right. The reason, therefore, lies in the opportunity to permit easiler ingress and egerses to the driver's seat.

Eighteen of the 25 makes seen at Madison Square Garden had the levers at the right, and this number exactlξ ΩΩΩ[C



Impression Conveyed by Mosaic Patice Effect with Reference to

corresponds with those which had right hand drive. Six had levers at the left, while one had these in the centre. Eighteen of the 32 at the Grand Central Palace also had right hand location of levers, again corresponding with the number of right hand driven machines. Four had levers at the left and 10 in the centre. Of the 33 new makes at Chicago, 22 had bevers at the right, one at the left and identified in the centre. In the total of 90, 68 were with right hand control, 11 with left hand, and 20 with central. It will be noted that this accounts for all but one, and that had the central levers nounted on the secretar levers.

The ×2 makers who displayed at Chicaco had on view 226 compieted vehicles and chassis. Of these 11 cars and six chassis were electric; 208 were gasoline driven, and of these five had one-evilinder engines; 41 two-splinder; six three-eylinder; 156 four-eylinder, and one six-cylinder Detailed description of the new models not seen at New York will be found in the succeeding paxes.

SAMPSON CARS EFFECT LARGE SAVING.

An instance of economy effected by the use of commercial vehicles in manicipal service is noted in Kamasa City, where the authorities advertised contrarts for six motor trucks about a year ago. After considerable keen competition the award was made to the United States Motor Company, which markets the Sampson cars, made by the Alden Sampson Manifacturing Company, betroit. Soon afterward three two and three three-ton trucks were placed in service in the street cleaning denarrance.

it was noted by Commissioner W. C. Weaver that each of the machines displaced from seven to this lores drawn vehicles and that at the end of three months the average cost of maintenance for the six automobiles was \$125.25 a month, compared with \$366 for the horse drawn equinment, which each of the Sampson vehicles replaced. Figuring at this ratio it was estimated that the motor equipment effected a saving of \$500.550, this amount representing the cost of the cars.

These figures, however, do not comprise depreciation or

tife r newals, but even considering these, there would remain a substantial sum in favor of the motor vehicle. The two-ton cars are utilized to gather up cans of street cleanings and to carry and dump the contents at the municipal grounds. In special emergencies, such as at large fires, they are employed to assist not fire department. Frequently the sewer department is aided. Two of the larger vehicles are employed in hauling asphalt, crunded rock, and and patting materials. They are fitted with a self-dumping body by means of which the driver may dump a three-ton-body by means of which the driver may dump a three-ton-like the materials etc.

VELIE TRUCK ON COUNTRY RUN.

To Inaugurate the 1912 commercial car season the Chicago branch of the Velie Moor Vehite Company, Moline, Ill., sent a three-ton truck londed with a 1912 Velie speedileft Chicago Sunday, stopping over night at Racine, arriving at left Chicago Sunday, stopping over night at Racine, arriving at a 11s destination the next morning at 19. The trip was made for the purpose of demonstrating the efficiency of the Velic on country roads during the winter. The car averaged 10.2 miles an hour and 4.1 miles to a galion of fuel, it experienced extreme cold weather and bad roads as well as numerous steep grades. Throughout the test the automobile performed consistently.

WHITE PATROL CAR FOR NEW HAVEN.

After considering carefully the practicability of the metor car for multipal service the police commissioners of New Haven, Conn., have placed an order with the White-Company, Cleveland, O., for a partor wagon. It will be a standard 1500-point chassis, engipped with a four-cylipder motor of 30 horsepower, and the body will be constructed on the same lines as other White vehicles of this type in service in other cities.



An Alcuse Setting in Which the Oriental Design is Still Fur-



OF THE 31 makes of trucks displayed at Chicago, which were not seen at the shown in the Baat, 33 were gassoline and one electric. Some of these were entirely new, never having been exhibited at any show previously. The following descriptions are intended to present the particular features claimed for each, indicating as well the departures from lines which have been noted heretofore in the older products. The machines exhibited at the New York displays were treated in a similar manner in the issue of MOTOR TRUCK for February.

A.d.

The Adams Bros. Company, Findiay, O., displayed four four-cylinder one-ton Adams trucks. Motor is in front under a Renault type hood, with radiator at the back, following foreign practise. Cylinders are cast en bloc with bore of 3,875 inches and stroke of five. Vaives are all on the right side. Cooling is by water, with centrifugal pump and flat vertical tube radiator. ignition is by Eisemann magneto and storage battery. Lubrication is by splush and force feed. Clutch is a Welis dry disc. Transmission is sciective, three speeds forward and reverse. Drive is by double side chain. Service brake on the lackshaft operated by pedal; two emergency brakes on rear wheels, operated by band lever. Springs are semi-elliptic, front and rear. Wheelbase is 121 inches; tread, 56; tires, 36 by three inches front, and 36 by 3.5 in rear. Chassis weight is 3200 pounds. Driver is at the left with levers in the centre.

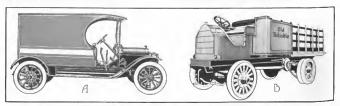
A particular feature of the construction is the mounting of the engine on a sub-frame and the use of a long propeller simit connecting the change speed mechanism, which is supported in from by a single cross member from one point, and at two points on another cross member at the rear. The jackshaft bearings are boited to the underside of the frame members. Full accessibility is afforded by lifting the hood from the front. This with the foreign radiator mounting gives the trace a decidedly distinctive alpearance. However, it will be seen that for the most part the construction follows standard lines.

Avery.

The Avery Company, Peoria, Ill., exhibited three murcylinder vehicles of two, three and five tons capacity. With the two and three-ton models, the motor is located under a hood, while the driver and levers are placed at the right and beside the rear portion of the hood. Cylinders are cast separately, with bore of 4.75 inches and stroke of five. Cooling is by water, with centrifugal pump and either honeycomb or vertical tube radiator. ignition is by storage battery, Eisemann coil and Eisemann dual automatic magneto. Lubrication is by force feed gear sump and splash. Clutch is a multiple disc, 11 large steel discs housed in the flywheel, dust proof and running in oil. Transmission is selective, three speeds forward and reverse. Hrive is by double side chains. Service brakes are internal expanding on countershaft, operated by pedal; emergency, internal expanding on rear wheels, operated by hand lever. Springs are semi-ciliptic all around. Wheelbase is 140 inches; tread, 62 in front and 68 in rear; tires, solid rubber, 36 by four-inch from and 36 by 3.5, dual, rear, on the twoton, and 3x by five, front, and 38 by four, dual, rear, on the three-ton. Chassis weight, 5500 pounds for two-ton and 5700 for the three.

In the main the five-ton model does not differ materially from the sambler machines. The motor is of the same-size, but is mounted on a sub-frame with three point suspension, the location being under the floor. The translation is made a unit with the Jackshaft housing. The driving clastics are enclosed in a steel case. The constraction throughout necessarily is heavier. While the wheelbase in the same the tread is 42 inches in front and 72 in the rear. These are solid, 38 by six inches in front, and 38 by five, dual, rear. Chassis weight is 7250 pounds.

The above specifications may be rewarded as standard, although the three-ton vehicle on display was equipped with cast steel rim wheels and wood plug lires, which also are furnished as regular equipment upon order. The net weight of the chassis in this case is 5875 pounds.



Two of the New Modeln Displayed at Chicago: A, 1500-Pound Dorris Wagon: U, 3.5-Ton Reliable Truck,

Bessenier.

The Bessemer Motor Truck Company, Grove City, Penn., presented one four-cylinder Bessemer truck, rated at one ton. The motor is in front under a hood, with driver at the left, and central control levers. Cylinders are cast en bloc with bore of 3.75 inches and stroke of 5.25. Cooling to by water. Ignition is by Bosch dual system high-tension magneto. Lubrication is by force feed. Ciutch is a cone with cork insert. Transmission is selective, three speeds forward and reverse. Drive Is by double side chain. Two sets of brakes are fitted, expanding and contracting on rear wheeis. Springs are semi-ciliptic in front and platform in rest. Wheelbase is 107 inches, tires, 34 by three inches in front and 34 by 3.5 in the rear,

Power is transmitted through the three speed transmission to a jackshaft boited to the frame and thence through side chains to the rear wheels. The spring hanger and end of jackshaft housing are integral, permitting the removal of the jackshaft by loosening two bolts and a cap. Particular attention has been paid to the matter of accessibility throughout. An American self-starter is fitted.

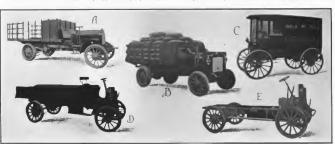
Blair.

three four-cylinder delivery wagons and a chassis, all of one-ton capacity. The motor is under the floor with driver and levers at the right. Cylinders are cast en bloc with bore of 3.75 inches and stroke of five. Cooling is by water, thermo-syphon system with honeycomb radiator. Ignition is Eisemann high tension magneto. Lubrication is by gear pump Cintch is a multiple disc, running in oil. Transmission is selective, three speeds forward and roverse. Drive is by shaft. Brakes are double expanding on rear wheels. Springs are semi-elliptic in front and full elliptic with auxillary coil springs in the rear. Wheelbase is 100 inches; tread, 56; tires, 36 by three inches front and 36 by 3.5 rear Chassis weight is 3000 pounds.

As special features, it is claimed that the motor is one of the few block designs having three main bearings, which is held to make for rigidity and long life. The motor and transmission are mounted on a sub-frame, and it is only necessary to remove the foot plates to work on any part of the mechanism. A drawbar la provided upon order, by means of which it is possible to utilize the truck as a tractor for hauling other light vehicles.

Diamond T.

The Diamond T Motor Car Company, Chicago, presented The Biair Manufacturing Company, Newark, O., showed one complete four-cylinder wagon and a chassis, both of five



A Group of Chicago Exhibits: A, Two-Ton Avery; B, L5-Ton Binit; C, 1999-Pound Mercury; D, One-Ton United States; E. fine-Ten Clask

its one-ton four-evilinder chassis. The motor is under a hood beside the driver, who is located at the right with right hand levers. Cylinders are east on bloc with bore of 4.125 inches and stroke of 5,25. Cooling is by water with centrifugal pump and square tube honeycomb radiator. ignition is by Bosch magneto and dry cells. Lubrication is by positive plunger pump and with constant lever. Clutch is a cone with cork inserts. Transmission is selective, three speeds forward and reverse. Drive is by worm gear and no universals. Two sets of brakes are fitted, contracting on rear wheel hubs and propeller shaft drum. Springs are semi-elliptic in front and pistform in rear. Wheelbase is 114 inches; trend, 60; tires, 34 by four inches front, 34 by three inches, dual, resr. Chassis weight is 4000 pounds.

As will be noted, this is one of the makes which presents a worm drive this year. The worm has four threads and is of the Hindiey type. A 2x-degree angle is employed, and there are four separate and distinct bearings. Of these, two on either side are thrust, while the others are annular. The worm is made demountable from the rear by the removal of two holding and two housing bolts.

Clark.

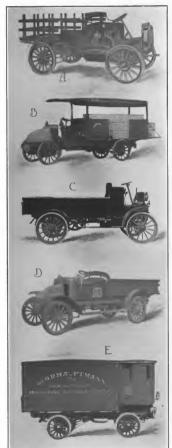
The Clark Delivery Car Company, Chicago, had on view

tons capacity, although a three-ton model is produced by the same concern. The motor is in front with driver and ievers at the right. In the vehicle shown the cylinders are east in pairs, with bore of five inches and stroke of 5.5. Cooling is by water. Ignition is by Bosch dual system. Clutch is a multiple disc, steel plates running in an oil tight case. Transmission is selective, three speeds forward and reverse. Drive is by double side chain. Wheelbase is 144 inches; tires, 36 by six, demountable, single in front and dual rear.

The construction is substantial throughout and of simple design, the frame being heavy and well braced at all vital points. The motor is suspended on a sub-frame and heavy plates are set between this and the main frame, acting as brace and pan at the same time. It may be added that the three-ton model carries the same specifications as above, with the exception that the springs are lighter and the tires are 36 by five inches.

Deserta

The Borris Motor Car Company, St. Louis, heretofore known as a pleasure car maker, displayed one four-cylinder Dorris 1.5-ton truck and a 1500-pound chassis. The motor is in front under a hood and the driver and levers at the



Shown at Phiengo: A, 1500-Pound Little Glant: B, One-Tan Adams: P, One-Tou I (BR): D, 1.5-Ton L, A, W.: E, Two-Ton Harder.

right. Cylinders are asst in pairs with bore of 4.375 Inches and stoke of five. Cooling is by water. Emitton is by Bosch magneto and dry cells. Lubrication is by the constant level splands system with gear jumin and oil reservoir in the houtom of the crankcase. Clutch is a special Dorris dry plate, multiple dise, housed in the fan fly sheet. Transmission is selective, three speeds forward and reverse. Drive is by propeller shaft with doubte universal Joint and straight line drive under load. Brakes are internal excanding and external contracting on rear wheels. Springs are sentiledigite in from and three joint platform in rear. Weel-ellipsi in from and three joint platform in rear. Weel-ellipsi in from and three joint platform in rear. Weel-ellipsi in from and three joint platform in rear.

Several features are noted, among which may be meatimed the fitting of a centrifugal governor, acting on the biotecthy valve in the intake pipe, set to limit the spied of the truck to 12 miles an hour. A water packet placed around the inter pipe from the carbon-refort to the branch is a connected with the water circulating system and by being a kept warm supplies a warm mixture to the motor at all the times. Another refinement is the use of a Proteo-Ostarter, when the most of the motor of the proteo-Ostarter of the proteo-Ostarter of proteo-Ostarter of the motor of the proteo-Ostarter of proteo-Ostarter of the motor of the proteo-Ostarter of proteo-Ostarter of the proteo-Ostarter proteo-

Count Date

Joseph Dain, Ottumwa, Ia., brought out a new classes. In the four-yillader Great plain of one-sion capacity. The driver is located as the left with centre control. The cylinders are cast en blow with bore of 3.75 inches and stroke of five. Cooling is by water, with pump and honeycomb radiator. Ignition is by K-W high-tension magneto. Labrication is by force feed. Clutch is a coure. Transmission is dual rifetion. Drive is by shaft and full flouting worm. Two sets of brakes are fitted, contracting and expandias. Springs are semi-ciliptic in front and three-quarter platform in the rear. Wheelbane is 100 inches; tread, 5.6.3 inches; tires, 36 by 3.5 in front, and 36 by four in rear. Chasais weight is 3000 nounder.

The transmission scheme is of decided interest, Inasmuch as the fiction disc are employed only for low speed and reverse, the direct drive being through the cone clutch. This whole assembly is made a part of the motor, providing a unit power and transmission plant. In addition, it is claimed for this construction that it provides a perfect three point supersion, power being transmitted at all times directly from the engine to the rear add in a straight line, no universal folium being used.

The transmission proper consists of two discs set at an angle to each other, which on low speed and reverse are rotated by the rim of the flywheel being brought into frictional contact with their edges. A friction wheel slideably connected with the propeller shaft and mounted between the discs, receives the power from the faces of the discs-When shifting the friction wheel across the faces of the discs, or to disengage the power when using the transmission, the driver may by a simple movement of the foot, lift the friction wheel out of engagement with the discs and thereby release the contact between it and the faces of the discs. The discs being mounted with their faces at an angle to each other, or in other words, the friction wheel being in wedging contact with the faces of the discs, makes it possible to relieve the frictional contact by lifting the friction wheel instead of moving the discs.

To shift from low to high speed, or from transmission to direct drive, the friction wheel, which carries one member of a cone clutch, is moved out of contact with the faces of the dises and into engagement with the other member of the cone clutch formed in the flywheel. Doing his moves the flywheel out of contact with the edges of the dises and leaves them dormant. The power is disengaged when on the direct drive by releasing the clutch with the foot beet.

Dig Eddy Google

With reference to the three point suspension, it may be said that the drive shaft is encased in a tube which has a slip joint near the rear end. The torque is cared for by this tube, and there are means of taking this away from the drive shaft, these being in the nature of buffers located immediately in front of the back axie. The slip joint is designed to prevent any tendency to transmit radial strains through the transmission or motor

Final drive is by a Hindley full floating worm drive axle. in direct line with the drive shaft and motor. The axle itself is of the semi-floating type, and an auxiliary cross spring is carried on the back cross member, this being braced on either side to the frame member by pressed steel strips, concaved to add strength and rigidity.

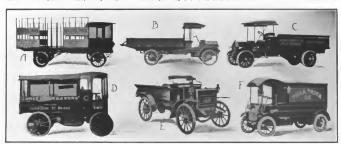
Harder

The Harder Auto Truck Company, Clicago, presented a two-ton stake, three-ton furniture van and a combination clo mical fire wagon. In these the motor is located under the floor with driver and levers at the right. The four cylinders are east in pairs and are of four different sizes - four by four inches, 4.25 by 4.75, 4.75 by five, and five by six. Cooling is by water with vertical tube radiator. Ignition is by Mea magneto. Labrication is by force feed and solash. Clutch is of special design, comprising 15 cone shaped and stroke of four Inches. Cooling is by water, with gear pump and flat tube radiator. Ignition is by Bosch magneto. Lubrication is by the splash and pump system. Clutch is a multiple disc. Transmission is selective, three speeds forward and reverse. Drive is by side chains. Service brake is on the jackshaft, and emergency on the rear wheels. Springs are semi-elliptic all around. Wheelbase is 120 Inches; trend, 5%; tires, 34 by three in front, and 34 by four in rear. Chassis weight is 2850 pounds.

Aithough a new design, it will be noted that this product does not depart greatly from accepted standard construction. The maker is prepared to furnish all types of special bodies upon order, although the regular equipment is an express wagon with carrying space four feet two inches in width and five feet 9.5 inches in platform length.

International.

The International Harvester Company of America, Chicago, exhibited three of its two-cylinder International auto wagons. The motor is located amidships with driver and levers at the right. The cylinders are opposed, with bore and stroke of five inches. Cooling is by air, with fans at the sides of the cylinders driven by belts from the flywheel. ignition is by Heinze magneto and battery. Lubrication is by a 10-feed mechanical oiler. Clutch is of the expanding



Six Additional New Models; A. Three-Ton Wilcox; B. 1.5-Ton Indianu; I. Two-Ton Stegeman; H. One-Ton Schmidt; E. 1566-Pound Monitor: F. 1500-Pound Philadelphia

plates. Transmission is selective, three speeds forward and band type. Transmission is planetary, with two speeds and reverse. Two sets of brakes are provided, internal and external. Wheelbase is 110 inches; tread, 58; tires, 32 by four in front and 34 by five in rear.

Several special features are noted. The radiator is hitsed on the left side, and uncoupling two hose connections makes it possible to swing this member as in opening a door. The power plant is then fully accessible for adjustment or removal. The spring system also is unusual. The front members are of the semi-clinic type but of specla! construction. The rear suspension is of the platform type, also special, and instead of a cross spring at the rear there is what is termed an equalizing traction bar. This is swivelled in the centre of the frame with the ends hung on spring shackles, so that the tendency is for the floor of the truck to remain horizontal even when one wheel drops into a hole

Indiana

The Harwood-Barley Manufacturing Company, Marion, ind., displayed one one-ton four-cylinder Indiana truck. The motor is in front under a hood, with driver at the right and centre control. The cylinders are cast singly, with bore

reverse. Drive is by chains. Service brake is on the differential and emergency on the rear wheels. Springs are full elitptic all around. Wheels are of the buggy type

Jeffers.

Although the Thomas B. Jeffers Company, Kenesha, Wis , is well known as the maker of Rambier pleasure cars, its trucks have been named Jeffery. One four-cylinder 1.5ton vehicle was shown. The motor is under the seat, with driver at the left and central control levers. Uvlinders are vertical and the horsepower rating is 35. Cooling is by water - Ignition is by Bosch high-tension magneto - Luluication is by combination force feed and splash. Transmission provides three speeds forward and reverse. Drive is by side chains. Service brake is on the jackshaft and emergency on the rear wheels. Springs are semi-elliptic all around. Wheelbase is 120 inches, tires, 34 by four in front, and 34 by three, dual, rear

Kinsel Kar

One of the most complete lines displayed was the Kissels Kar, made by the Kissel Motor Car Company, Hartford, Wis-This included the 1500 pound, one, two, three and five-ton, models. In these the four-cylinder motor is located in from under a hood, with driver and levers at the right. In the smaller vehicles the bore is 4.5 inches and stroke, 4.75, and while in the three and five-ton models the bore is 4.875 and



Two-Ton KisselKar Truck at Chicago Display,

the atroke five. Cooling is by water, with centrifugal jound, square tube radiator and botl driven fan. Isinition is other by Mea or Bosch magneto. Labrication is by splash. Clutch is a leather faced come, with adjustable spring Inserta underneath the leather, permitting gradual engagement, Tranmission is selective, four speeds forward and reverse. Drive is by chains. Service brakes are contracting on consershaft; emergency, internal expanding on rear wheels. Four semi-elliptic springs are employed.

In the (wo-ton vehicles the wheelbase is 140 inclies; tread, 50; tires, 34 by four, front, and 36 by 3.5, dual, rear. Chassis is 18 feet over all and weighs 4450 pounds. In the three-ton, wheelbase is 144 inches; tread, 68; tires, 36 by four, front, and the same size, dual, rear. Chassis is 19 feet four inches, and weighs 5200 pounds. In the five-ton, the wheelbase is 156 inches; tread, 69; tires, 36 by fivefront, and 40 by six, dual, rear. Chassis is 20 feet six inches, and weighs 5000 pounds.

The maker of this line claims there is a Kisselkar truck or delivery magne designed to give he lowest cost service, whether li be wanted for hauling heavy freightage, fast delivery of lighter merchandise, or for long or short hauls. Reserve chaptily, reserve power and reserve structural strength are held to give the widest latitude of service. In addition it is stated that the excress ability is not gained at the ascriftce of low fuel cost, for in competition the Kissel-Kar has demonstrated its ability to master all road conditions under excess loads at from 15-to 20 per cent, less fuel consamption than others.

L. A. W.

The L. A. W. Motor Trick Usunany, Finding, O., Ashowed one four Motor Trick Usunany, Finding, O., Ashowed one form of the front under a Renault type hood, and driver either at the front under a Renault type hood, and driver either at the right or left with the return control lever. The eyilorders are cast en bloc with hore of 3.75 inches and stroke of five. Cooling is by water, theremosphon asystem, with radiation behind the motor in front of the dash. Ignition is by hore feed through, a hollow crankshaft. Clutch is a multiple die, dry. Transmission is acceptable and reverse and there are extended and internal. Springs are semi-sulprities trade of the dry of the day of the

A special feature is the final drive scheme, wherein the drive is through spur gars first, thence through the conventional bevel gear mechanism to the rear wheels. This is done to obtain the gear reduction without enlarging the 44ff-crential housing. The Renault type hood and foreign radiator placing puts the L. A. W. In the distinctive class.

Little Giant.

March, 1912.

The Chicago Pacumatic Tool Company, displayed three two-vigiliary behiefers and a chassis, rated at one ton each. The motor is located under the seat with driver and levers at it is right. The cylinders are opposed with key-inch bore and fear-tinch stroke. Cooling is by water, thermo-apphon system, with flat vertical tube radiator. English is by splitter magneto. Lubrication is by plunger system. Clutch is a multiple disc. Transmission is plant-stay, two species forward and reverse. Urive is by side chains Brakens are internal exhability and external contraction on rear wheel buls. Springs are three-quarter elliptic in front and full elliptic in rear. Wheelbase is 51 inches; treat, 58; they is by side chains Brakens are three-quarter elliptic in front and full elliptic in rear. Wheelbase is 51 inches; treat, 58; they is no front, and 26 by 2.5 in rear. Chassis evicilit is 2.62 in tenus.

Mercury.

The Meteury Manufacturing Company, Chicago, presented three two-villade Meteury vehicles of 1000 points sented three two-villade Meteury vehicles of 1000 points and placed to the motor is under the sent with driver and single control lever at the right. The cylinders are horizontal opposed, with hore of 425 inches and stroke of four. Cooling is by air. Ignition is by jump spark, dry cells and splash. Clutch is a single disc. Transmission is planetary, two speech forward and reverse. Brakes are internal expanding. Springs are full elliptic, front and rear. Wheels are likely inches; trend, sic. Ures, 28 by 1.73 Inches in front and 40 by 1.73 Inches in rear. Wheels are of the luggy type. Chassis weight is 1500 pounds.

Mospi.

The Mogul Motor Truck Company, Chicago, she wed awa four-cylinder Mogul vehicles. Due was a sixton lumber truck and the other a two-ton stake wagon. Motor is ander the floor and driver and levers at the right. Due ribing the larger vehicle first. The cylinders are cast in pairs with 5,25-inch bore and 5,15-inch stroke. Cooling is by water, centrifusal pump, adjustable radiator for and honoecomb radiator. Ignition is by high-tension magneto. Lubrication is by splash. Chiech ha multiple disc, atternate discs made of bronze and steel, ranning in an oil tight housing. Transmission is progressive, three speeds forward and reverse. Two sets of equalizing brakes are located on the rear hubs, both internal expanding. Springs are semine-diliptic, front and rear. Wheelmans is 155 inches; tread, 60.5; tires, 36 by seven inches in front and d by sixt dual, in rear.

The two-ton model has cylinders cast en bloc, with hore of 4.125 inches and stroke of 5.25. Transmission is selective, three speeds forward and reverse. Service brakes are mounted on the jackshaft, emergency on the rear

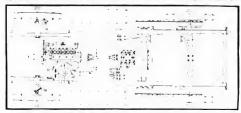


Sty-Ton Morni with Special Lumber Body.

wheels. Wheelbase is 118 Inches; tires, 44 by three inches in front, and 52 by three in rear. In other respects (t is similar to the larger machine.

The lumber truck is designed to fulfill the particular

requirements of this industry. It is equipped with a patented roller bed device by means of which an entire load may be taken on or unloaded in a few minutes, without disturbing the pilling. A hand operated which moves the rollers be-



Chassis of the One-Ton Natco Wagon, Presenting the Relation of the Parts.

that the work may be accomplished easily by one man.

Monitor.

The Monitor Automobile Works, Janeaville, Wis, displayed two two-ylinder Monitor vehicles and two chassis, all of 1,500 pounds capacity. The motor is located under the floor with driver and slugic control lever at the right. The cylinders are opposed with hore of five linches and stroke of four. Cooline is by water, therm-sayphon system, with cellular radiator. Lightlen is by Remy magneto and dry cells. Labrication is by mechanical order. Clurch is a cone. Transmission is planetary, two speeds forward and reverse. Drive is by short. Brakes are entirely and external on rear wheels. Springs are semi-velliptic in front and full elliptic in rear. Wheelbase is too lunches; tread, 56 inches; trees, 33 by 2.5 linches in front and 34 by three in rear. Chassis weight is 2200 pounds.

The National Motor Truck Company, Bay City, Mich., now calls its product the Native, and was represented by one four-cylinder truck and a chassis, both of one-ton caparity. The motor is under a hood and driver at the left with central control levers. Cylinders are east en bloc with hore of 3.5 linches and stroke of five. Cooling ta by water, thermosyphon system, with vertical tube radiator, lignition is by hilk-dension mas:

Sates,

neon. Lubrication is by force feed. Clutch is a leather faced component of the mapported by compression springs, itrakes are double, internal set in rear hubs. Springs are semi-eliptic, front and rear. Wheelbass is 144 inches; tread, 56; trea, 36 by 3.5, front and rear. Chassis weight in 2400 pounds

The motor is supported on a suiteframe and is so located that the driver's seat is brought up to the rear of the hood, which is very short, giving the appearance of a motor - under - the - floor location. When the bonnet is raised, the entire mechanism is exposed. The jackshaft is of the full floating

type, the housing being attached to the underside of the frame. Final drive is by double side chains, which are encased and run in an oil bath. An auxiliary spring is carried under a double cross member in the rear, this converging at

the centre and supplying an additional brace,

A particular feature is the method of lubrication, in which the oil is filtered through water. The main reservoir of six quarts capacity is attached to the bottom of the en-

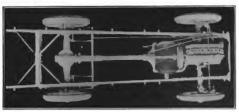
gine case, and the pumps, which are gear driven by camshaft, are located in a compartment at the forward end of the motor. The oll is forced from the pumps to the end bearings, through the crankshaft to the connecting rod pins. The excess returns to the main supply tank through the standplue, which extends to within .375 inch of the bottom of the water compartment, and owing to the difference in specific gravity between water and oil, the latter rises to the top of the water and overflows into the main reservoir. During the passage of the lubricant through the water, carbon

which is collected by the oil while performing its lubricating function, is preclidated to the bottom of the water compartition, which can be cleaned thoroughly at certain literrals. In addition to the clarifying of the oil, it also is cooled. Labricant in the forward pipe line flows through the sight feed on the dash.

Old Iteliable.

The Ibery Lee Power Company, Chicago, showed one four-cylinder Old Reliable 3-tient truck and chassis of the same capacity. The motor is located under the door, with driver and levers at the right. Cylinders have a bore of 4.75 inches and stroke of 5.5. Cooling is by water. Lustino is by a double system. Lubrication is by a self-contained system. Clutch is a multiple disc. Transmission is selective.

Although rated at 2.5 cons, it is said that five tons have been handled on this vehicle with satisfactory results. The motor is carried on a sub-frame, and so arranged that it may be accessible resulty by the removal of the radiator, which is supported on trunions, and the holted tumper cross member. In addition to the support given the transmission through the jackistal housing, the forward end of the transmission case is lotted to a heavy cross member that is securely braced with guestes. Back of the jackshaft



tire mechanism is exposed. The Great Data Gas-Ton Changin, Employing Novel Frietless Transmission and No-Called Perfect

and immediately over the rear axie is another cross member. The special features claimed for the trick are its complete accessibility and its sturdy construction throughout for both the chassis and the bodies.



Indicating Accessibility of Adams Power Plant, and Foreign Radintor Mounting.

Philadelphia.

The Philadelphia Truck Company, Philadelphia, showed outer four-cylinder 1500-pound wagon. The motor is located nuder the floor with driver at the left and central control levers. Cylinders are east in pairs with hore of 5.625 inches and stroke of 4.25. Cooling is by water, with centrifucat pums and honeycomb radiator. Ignifion is by storage battery. Lubrication is by force feed. Clutch is a dry disc, Raybetons fared. Transmission is selective, three speeds forward and reverse. Drive is by shaft. Two sets of brakes are fitted, both internal expanding. Springs are semi-elliptic in from and three-quarter clipitic in rear. Wheelinss is 112 inches; tread, 56; tires, 34 by four, all around. Chassis wight is 2100 sounds.

The motor is a new model of the Pern line, seen for the first lime at the pleasure can slow in Cilicaco. It is supported at three joints on the main frame, and is of unit construction, including an E. E. electric self-rativer as an integral part. This means that the combined motor-generator of the starting system takes the mean place of the flywheel, the functions of the latter being performed by the field of the generator.

Premier

The Premier Motor Manufacturing Company, Indianapcity, Ind., well known as maker of the Premier pleasure line, displayed in any Premier truck of 1.5 tons capacity. The motor is the same as that employed on the "4-10" cars, but the construction of the chassis frame has been materially strengthened throughout. This is particularly true of the rear ask, although it is of the same design as that of the pleasure cars. Dual pneumatic three were shown, but swilds are offered as an option. Semi-elliptic springs, from and rear, replace the three-quarter elliptic members of the viscourse line.

Sandusky.

The Sandusky Auto Parts & Motor Trusk Company, Sandusky, O., presented two four-syllader 1.5-ton veibles. The motor is located under the floor with driver and levers at the left. Cylinders are cast en bloe with bore of 2.75-lincies and stroke of five. Cooling is by water, with centralization part veit and the left of the cooling is by water, with centralization part veit at the radiator. Ignition is not present the part of the part of

Mea magneto. Lubrication is by the constant level splash system. Clutch is a cone. Transmission is askective, three speeds forward and reverse. Brakes are double expanding, both in rear hubs. Springs are semi-elliptic in front and three-quarter platform in rear. Wheelbass is 106 linches; trent, 36; (fires, 40 b) 3.5 linches solid or 36 by five pneumatic, front and rear.

March, 1912.

Accessibility of the power plant is afforded by mounting on a sub-frame, which can be withdrawn boddly from the chassis. The removal is accomplished by simply withdrawing six spring controlled plumeers, rasing the steering column and operating two levers that release the autiframe and drop it slows note rollers. The assembly then may be withdrawn much the same as pulling out a drawer. The radiator and finel tank are connected to the power plant in such manner that the removal may be made without breaking water, fuel or detectie connections.

Schmidt.

The Schmidt Bros. Company, Chicago, showed two twocylinder vehicles of Laifton and one-ton capacity and a chassis. The motor is located amidships and the driver at the right. The single-lever for high speed is attached to the steering post, leaving the front of the car remarkably free. Cylinders are opiosed. Cooling is by air. Limition is by mancien. Luthrication is by force feed and splash. Transmission is planetary, two speeds forward and reverse. Drive is by rother claim. Brakes are inhernal expanding. Springs are quarter-elliptic in front and coll in rear. Wheelbase is 22 Inches, and thres, 38 by 2.5 Inches on the oneton model, and 80 Inches and 38 by two inches, respectively, on the half-ton.

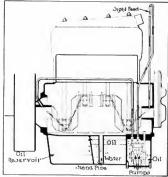
Service.

The Service Motor Car Company, Walsah, Ind., presented one four-ylinder one-ton Service wayon and a chassis. The cylinders have a bore of 3.75 Inches and stroke of 5.25. Cooling is by water. Indition is by magneto. Transmission is friction. Drive is by chain. Springs are semi-cliptic all around. Large, solid tires are fitted.

It may be stated that the chief feature of the Services than it may be stated that the chief feature of the Services which is until a supported by an overhead yoke, and two cross members support the bearings of the driven discs. The shifting device is attached to the overhead yoke, with a long root reaching to the operating lever beaded the driver. The two driven discs are operated by means of a pedal and are held against the driven discs by heavy springs, and a clickitener in vasc the load pull exceeds the holding ability of the santings.



Illustrating Method of Removing Power Plant, Hadiator and Fuel Tank on Sandusky Truck,



Embrication System Employed on Nates Vehicles, by Which Oli

Another novelty in comestion with the exhibit was the fitting of a pulley at the back of the frame, to which a best may be sighted for use in striving agricultural implements, etc. This is operated by means of a shaft from the back striving pulley, and is supported by means of bearings attached to the frame at the back.

Sec. 10 1

The A. O. Statit Company, Mitwooker, Wis, displayed one four-eylinder five-ton Smith truck. The motor is located in from under a bood with driver and levers at the right. The cylinders have a bore of 4.5 in dres and stroke of 5.5. Couling is by water, function is by loos in magneto. Clutch is a cone. Transmission in the Cotta system, with scars always in mesh. Brive is lin worm.

There is very little about this vehicle that is convenient tunni in design. The trains is of severionic action, present with a headed channel and concave surface. The cross members are of the overhead yoke (typ, serving also to each ato the dash and all other parts.

The transmission and roar system are a unit, and are so, so, designed that there is absolutely a straight line to the so, designed that there is absolutely a straight line to the worm drive. The transmission housing has an enforcement at the forward end, designed to be lotted to the fold and so socket joint attached to the cross member. On the top is a socket joint attached to the cross-member. On the top is a grant and the construction is such that the entire transmission may be removed without disturbing a single star.

The drive sinfi extends through the large torsion to be and is connected to the worm, which is of the Lanchester design. The latter is so mounted that it may be removed by taking out the rear flange boll, thus permitting the displacement of the entire housing.

STATE

The Staver Cardiage Company, Chicago, presented one four-cylinder ambulance - An is well known, this conjunay has been producing pleasure cars for some years, and the volicle displayed does not depart greatly from the design of these, except in the heavier construction. The same 4d horseowing motor is embloyed, and the body is fitted with all the modern appliances in connection with the work it is designed to perform.

Steveman.

The Stegeman Motor Car Company, Milwaukee, Wis., displayed two four-cylinder Stegeman vehicles and a chasals. The motor is located in front under a bood, and driver at the left with central control levers. Two models were shown, the two and the six-ton. Cylinders have a bore of 1.125 inches and stroke of 5.25 in the former, and 4.5 by 5.5 in the latter. Cooling is by water, with centrifugal pump and vertical flat tube radiator. Ignition is by automatically timed magneto. Lubrication is by force feed and splash. Cintch is a multiple disc, dry plate. Transmission is selective, three speeds forward and reverse. Service brake is external contracting on propeller shaft, emergency internal expanding on rear wheels. Springs are semi-elliptic, front and rear. Wheelbase is 125 Inches on the smaller and 145 on the larger. Tread is 60 and 78, respectively. Tires on the two-ton model are 34 by four in front and 36 by three, dual, in the rear. On the larger, these members are 36 by six in front, and 40 by six, dual, in rear. Chassis weight is took pounds for the smaller and food pounds for the larger

Sternterg.

The Sternberg Manufacturing Company, Mitwankee, Wits, showed one four-cylinder four-ton (missis Cylinders are coast in pairs, with here of the inches and stroke of \$5.\$. Cooling is by water, with sear point and flat tube radiator. Izultion is by Eisemann magnete and storage battery. Letterior in by Siesmann magnete and storage battery. Letterior in the Section of the Chitch is a Hele-Shaw Transmission is scherity, three speeds forward and reverse Drive is by Januel. Brakes are on Jackshafts and cear wheels. Strings are semi-cilipeted all around, with auxiliary spring in the rear. Wheelse is 144 inches, trend, 79; 1100, 26 in tre, single in from and doud, erer. Chiesels, weight is Toom pounds.

Laired States,

The United States Mutter Track Company, Comemon, I. I., disblayed a four-synthetic, four-ton-truck and chasses, Cylinders are east in pairs, with here of 1.5 tuches and stricks of 5.5. Cooling is by weer, with centritrocal going and vertical tothe radiator. Lumien is in Bosed dual mannets. Lathreaton is by sear joining. Clutch is an internal context Transmission is selective, three specks forward self-reverse. Britis is by side chains. Brakes are on juckshaft and rear where. Springs are semi-clipite front and rear, with another years semi-clipite front and rear, with another years springs in the rear. Wheelbage is 114 inches; tread, 62 linches in front, 64 lin rear, then, 64 linches in front, 64 linches in front, 65 by five, dual, in rear. Chassis weight in 5 You minule.



Hinstending Sent Location and Wood Ping Tires on Services.

Cuitor.

The Stephenson Motor Car Company, Milwaukee, Wis., control of which is said to have passed to the J. I. Case Threshing Machine Company, Racine, Wis., presented its four-cylinder one and three-ton trucks, now known under the name of Utility. The motor is under the floor, and driver at the right with the levers in the centre. Cylinders are cast in pairs, with bore of 4.75 inches and stroke of five inches on the smaller vehicle and 4.25-inch bove and liveinch stroke on the larger. Cooling is by water, with centrifugal pump and vertical tube radiator. Ignition is by Elsemann magneto. Lubrication is self-contained within the crankcase. Transmission is double friction. Drive is by double chain. Ilrakes are expanding members. Springs are semi-elliptic in front and three-quarter platform in rear. Wheelbase is 134 inches; trend, 60; tires, 42 by five inches, all around.

The friction transmission is distinctive, being of the Stephenson design. A long propeller shaft connects the motor and one driving disc, the latter being supported on a cross member. The other driving disc also is supported by a cross member, and the driven discs are carried on a

Wilcox.

The H. E. Wilson Motor Car Company, Minnespotis, Minn, showed one four-cylinder three-ton truck and a chassis. The motor is in the cab, with driver and leveras at the right. Cylinders are cast in pairs, with bors of 4.25 inches and stroke of 4.5. Cooling is by water. Ignition of the cooling is by Boach high-tension magneto. Lubrication is by gear driven pump. Clutch is a rone. Transmission is selective, three speeds forward and reverse. Drive is by side chains. Two sets of brakes are fitted, service on the jackshaft and concepting on the rear wheels, both internal expanding are full elliptic in front and three-quarter platform in roar. Wheelshas is 128 inches; treed, 52; trees, 36 by 10 four inches in front, 35 by 3.5, dual, rear. Chassis weight is 5500 pounds.

DECATUR TRUCK IN SEVERE TEST.

To demonstrate the practicability of the commercial automobile a 1.5-ton Decatur track, made by the Decatur Mo-



Decatur 1,5-Ton Mechanical Transport Which Participated in a Non-Nop Bun Recently, and Which Carried a Consignment of Polarine Oll from Boston to New York,

jackshaft, which in turn carries the sprockets transmitting the power to the rear wheels by chains.

Whitesides,

The Whitesides Commercial Car Company, New Castle, Ind., displayed one four-sylinder 1500-point truck. The motor is in front under a hood with driver and levers at the right. Cylinders are east on bloc, with hore of 1.125 luches and stroke of 1.5. Cooling is by water, thermosyphon system. Ignition is by Splittlerf magneto and dry cells. Lubrication is self-contained. Transmission is planetary, two speeds forward and reverse. Drive is by double-side chains. Brakes are internal explanding on rear wheel hubs. Syrings are full elliptic, front and rear. Wheelbase is 118 inches; tries, 3 4 by 2.5 inches.

A feature of the construction is the use of kiln dried white oak, reinforced by steel armor for the frame. These members are held in place with heavy wood screws, frequently placed and staggered. The cross members also are armored wood, held in place by means of fron gusted plates. Taces latter are not right angle braces, but extend across the corners. a seven-day non-stop run. The event was sanctioned by the American Automobile Association and offield observa accompanied the machine. The headquarters for the carwas at the Flanow Flins Company's service depot 147 West 37th acree, New York Uty, distributor for the Decatur product.

The power wagon entried a maximum load of Polarius oil during list trial and the trips consisted of routes leading out of New York, including runs into Connecticut territory. Previous to the trials the truck was driven from Boston to New York City carrying a load of Polarine oil consigned to the Standard Oil Company of the latter etts. During the least snow storms and extreme cold weather were encountered.

The use of the electric commercial vehicle is growing in favor in Botton and sales are reported weekly. Among those recorded recently was a five-ton coal truck to the Metropolitan Coal Company and a 3-ton General Vehicle made by the General Vehicle Company, Long Island City, N. Y., to the New Endand Confectionery Company.

The Red by Google

BOSTON'S MAMMOTH MOTOR TRUCK SHOW.

Exhibition Will Be the Largest Ever Held Under One Roof in America and Its Displays Will Be the Most Complete and Satisfactory of the Year.

THE first exclusive show of service wagons to be field in Boston will be opened in Mechanics' Building, Hantington avenue, the evening of March 13 and will be concluded the evening of March 20, this giving the same jougth of time for this exhibition that has been devoted to the display of pleasure vehicles in previous years. This policy is in keeping with those of the managements of the shows at New York and Chicago, where the industrial wagons were shown separately from those devoted to pleasure and professional use.

This will be the first exhibition at Boston where the displays will be divided, although for six years there has been a division given over to showing of vehicles created for industrial use. In previous years the wagons and trucks have been subordinated to the pleasure machines and have been located in the basement where they could not possibly receive the attention directed toward the more prominent exhibits on the first floor.

No eriticism can be made of the policy of previous years because until within a matter of 18 months there was little realization of the possibilities of the service wagon market, and a year ago the conditions were such that a division of the two classes of exhibits could not well be male. The show will be made by the Bostun Commercial Motor Vehicle Association, under the direction . Chester 1 Campbell, and while it will be practically a continuation of the ex-

position of the Russon Automobile Dealers' Association, it will have separate existence

1.5. HATHAWAY

Duretor

A B HENLEY

Directo

The possibilities for business in this show are fully realized to the members of the organization conducting it, and it may be said that, as has been the experience with itoston exhibitions, it will be the largest and most productive of the national expositions of the year. There is every reason why this result should obtain. The eastern market is the richest of the world. This has been amply proven in the utilization of the pleasure car and with the power wagon,

The conditions are unlike those existing elsewhere and there are innumerable influences that impel the use of the truck or wagon in every phase of industry and commerce.

Considered from every viewpoint the market is superior to all others. The best demonstration of this is the history of the automobile trade. The people have the motor knowledge that is essential to successful utilization of the power wagon in business. It is not necessary to engage in educational campaigns or missionary work to establish the value of the power vehicle as compared with existing methods of

transportation. The reliability and endurance of the service wagon is acknowledged and with a majority of the people, at least, the principal question to be determined is the manner of adapting the machines to the methods the vogue, or changing the systems for haulage, both recelving and delivering to the better utilization of mechanical transports.

Why the automoblie wagon has decided advantages need not be discussed. First of all there are more commercial centres there in any other section of the country, some of them comparatively short distances apart, each of which draws to it legstness of material proportions, No. one muntequality monossilizes the trade. The many lines of communication preclude this There are the finest systems of highways in America with main theroughfares generally connecting these cities and lowns. by which delivery may

be made at long dis-







I W MAGLIRE



Officials of the Hoston Commercial Motor Vehicle Association.

A P I NOFRHILL

tances. These roads mean quicker and more contomical delivers than is mussible in other parts of the nation. They mean the longer endurance of the vehicle and the minimum of operating expense. They mean the expansion of business of the individual, firm or curporation proportionate to the facilities for delivery, and while a maximum of 20 miles daily for a horse would mean a radius of less than 10 miles, the truck or wagon may be driven several times this distance in less time and haul a load several times larger.

There is no uncertainty as to the work that may be accomplished by the service wagon. There is no doubt as to its practical utility, and the main question is now small the method of doing the work now done be changed so that it may bring either of two results—the tessening of the expense for what is now accomplished, or so increasing the field for bunders that it may be materially developed. It is not to be expected that the first may be so planned that it cannot be improved upon, and the second cannot be realized immediately; there must be creation of the demand through the purchasing advantages offered to the people.

There are differing elements entering into the market

smalled to the largest vehicles and using them for equally varying work. Those who have turned to the newer method of hashige have found that business has followed the expedition of delivery. Economy of time to the purchaser is quite an accessary as to the seller, and the value of purchasing where goods are stocked and can be sent out without delay is manager.

There is no longer need for the business man to fear compilerations from the possible failure of a service wagon. Every endeavor has been directed toward producing what is reliable and will endure, and the representatives have also made provision for supplying whatever may be needed for



Mechanics' Building, Where the Boston Motor Truck Show Will Take Place.

that must also be considered by those who are selling service wagons. One of these is the character of competition to be met with, but it is evident that where the largest volume of business may be obtained there are those who are striving to secure whatever proportion of it their vehicles will specially serve. Where there is no business there is no activity and no rivalry among the distributors, if there be even representation.

In the cities of proportions, where the business interests are large, the service wagon has been adopted in surprising numbers. This does not mean by large enterprises only, but by every interest that may be named, employing from the restoration and replacement in the event of wear. Some of the manufacturers have even gone further and provided their own service stations for the express purpose of maintaining the whelea the build, and some of these are fitted so as to give every attention that could be found in a marker as well as the expert attention that is expected from those who specialize care and upkeep of the machines they sell. These are extremely large in some instances, the structures built purposely for the requirements of such service, and with equipment and facilities to do everything that might be desired. In fact some of these establishments are even more than factories because they combine every de-

partment of a factors as well as the accommodations and the service of the garage.

These conditions make apparent to the man who is considering the adoption of the service wagon that he will have to deal with entirely different situations than did those who first began mechanical haulage, and that he will not have to work out results blindly, for he has available the experience of those who have given the subject the closest study and have dealt with it from every sngle and aspect. The market was never so promising, because there are innumerable reasons why the saving in handling of material or commodities is decidedly economical. Where it is practical to de so the motor truck or wagon has been used instead of the railroad for short hank, this being due to obvious economy as well as the saving of time, besides the elimination of the possibility of damage

Considering the Boston exhibition as it has been thus far arranged for: it will be fully as large as both the metropolitan shows, so far as number of makes of cars displayed is concerned, and it will closely approach, if not canal, the Chicago show. There is a total exhibition area in Mechanics' Building of 105,000 square feet, all of which has been given over to the displays of trucks, wagons, accossories and supplies. The decorations as arranged for

the pleasure car exhibition will not be removed and the machines will be shown in one of the most ideasing settings created this season. As striking as were the other national expositions it is declared by Manager Campbell that the Boston show will be superior to them all in point of attractiveness

The list of service wagon exhibitors has not been revised and it is expected that it will be considerally augmented before the opening of the show. As the facts are now known there will be a total of 61 different makes of service vehtcles, which will be displayed generally by the local representatives or the branches of the makers. It is probable that this numher will be increased to 70 at least. The proportions of the show may be the better understood when it is known that at Madison Square Garden in January, 37 different makes were shown, and at Grand Central Palace 33 different makes, mak. Chester I, Campbell, Manager Boston

ing a total of 70 for both. At the Chicago exposition 82 different productions were on display. In 1911 there were 35 makes shown at Madison Square Garden and 57 were seen at Chicago. Taking the figures as stated it will be seen that Boston will have an exhibition that will far exceed all others save that at Chicago last month, and there is a prospect it will equal that

In considering the known exhibitors it will be found that of the 61, 22 manufacture both pleasure cars and service wagons, while 33 are engaged exclusively in production of the commercial type. Last year 20 makes were of the first named category and 21 of the second. Of the exhibitors of 1911, 13 will make no display at Boston this season, and of these five manufacture service wagons exclusively and the remaining eight produce both types of vehicle

Of the exhibitors who will be seen this year, 28 made exhibition a year ago and there will be 33 who did not show machines in 1911, which is a sufficient indication of what will be new to Bostonians and the thousands of visitors who will visit the big exhibition. So far as the show is concerned there will be, exclusive of the makes seen in 1911, 33 different makes of vehicles which, while possibly not unknown, will be decidedly interesting to all. There will be unusual opportunity for the examination and comparison of the different exhibits, while there will be display and demonstration of the body equipment that has been developed during the past year to meet the demands of the different

As there is much dependent upon the special form of body installations that can be made, and a material factor in truck service is the special or general work that can be done by it, there will be a degree of attention directed toward the bodies that will canal that given to the chassis. While some of the machines have been shown at other large exhibitions they will be in every way new to lloston, and their advantages will be expatiated by those who will have them in change

It is needless to specify that the show will introduce some features that are distinctly new. These will be found in the chassis, the bodies, and in the equipment installed upon them. It is probable there will be much to interest in the application of self-starting devices, although these have not as yet been given serious consideration by any large percentage of the manufacturers of service wagons. There is oulte as much demand, however, for the installation of starters as with the pleasure machines. Besides this there will be distinct progression manifested in the details of construction as compared with the show of a year since. Many

> of these have been written of and described, but they will assuredly be interesting to those who have taken up the study of the problem of vehicular transpurtation

in connection with the show there will be a number of demonstrations made for the purpose of establishing facts for the special benefit of those who will visit the exhibition. These will vary dechledly and it is not improbable that some will be made with a view of showing more than one capacity or quality. Naturally they will be given as much prominence as is consistent with the undertakings. There will not be so much attention to "stants" as to practical utilizations, which will serve to inform and guide those making investigation or inquiry

One of the best indications of the concern in the service wagon and the possibilities through its use is that there will be visits made the show by organizations of commercial character, especially for

the purpose of learning systematically from those regarded as authorities facts that have material hearing. For instance, the New England Coal Dealers' Association, a body that has a membership of something like 1500 men, will visit the exhibition, this being the result of the association taking up the subject of transportation,

Undoubtedly this opportunity for the representatives of the manufacturers coming into contact with so many business men cannot be otherwise than mutually beneficial. Ohylously it has been the very satisfactory result from practical service that has created this interest.

The exhibition of accessories and sopplies will be largely continued through the power wagon show. While it is true that primarily many of the articles have been created and produced for pleasure car equipment and use, it is also a fact that these may be used in many instances with service wagons, and with interest of the visitors to the truck exhibition often directed toward two types of vehicie instead of one there is abundant reason to expect these will receive a deal of attention.

The following is the list of exhibitors, which is subject to revision, there doubtless being additions at opening time.



tutomobile them.

CLASSIFIED EXHIBITORS AT BOSTON AUTOMOBILE SHOW.

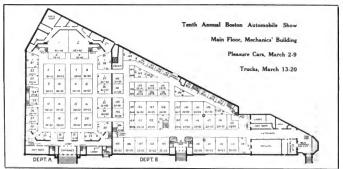
GASOLINE COMMERCIAL CARS. (Second Week.)

- 110-111 Ateo-American Locomotive Company, 591 Boylston street,
- Boston 132-133 Atterbury-Atterbury h
- Truck Company, Buffalo, N. Y. 34-37 Astoesr Autocar Company, 642 Beacon street, Boston, Bessemer - Bessemer Motor
- Truck Company, Grove City. Penn Bulek-Buick Motor Company,
- Motor Mart, Boston, Cameres Standard Motor Truck Company, 9 Harcourt
- street, Boston. street, Boston, 346 thase—Chase Motor Truck Company, Syracuse, N. Y. Clark—Edward S. Clark, 242 Freeport street, Dorchester,
- 222-224 Commer-Dodge Motor Ve-
- hicle Company, Lansdowne street, Cambridge, Mass, Commerce - Curtis - Hawkins

- 114 International International Harvester Company of America 42 Somerville avenue, Somerville. Manu
- 100-101 Kelly-Eastern Motor Truck Company, Shoe & Leather build-
- ing, t'ambridge, Mass
 129-130 KineriKar KisselKar New England Branch, Motor Mart,
- Boston 8, 12 Kees Underhill Company, 885
- Boylston street, Boston.

 151-152 Kochler-L. E. Schlotterback
 Manufacturing Company, East
- Orange, N. J. Lanth-Jacrgens - Lauth-Juer-gens Motor Car Company,
- Lima, O. Lippard - Stewart - Whitney-Barney Company, \$23 Boylaton street, Boston,
- Locomobile Locomobile Com-pany of America, 700 Commonwealth avenue, Boston,
- 19 Losler-Losler Motor Company, 616 Beacon street, Boston, 228-235 Mack-Mack Motor Truck

- 232-235 Sandasky Sandusky Auto Parts & Motor Truck Company, Sandusky, O.
- 22 Sanford Munford-Herbert Company, Syracuse, N. Y.
- 113-117 Sampson I'nited Motor Boston Company, 100 Massa-chusetts avenue, Boston. 254-256 Samrer-Mack Motor Truck Company, 201 Pleasant street.
- Boston 142-144 Speedwell -- Curtis-Hawkins Company, 162 Columbus avenue,
- Boston, Stearns -J II. MacAlman. Massachusetts avenue, Boston.
- Sternberg-Hanson Bros. 95 Commercial street, Boston, Terl-Woodworth - Teel Manufacturing Company, Main street, Medford, Mass
- 113 Universal Universal Motor
- Truck Company, Detroit, 145-146 Velle-Velle Boston Branch, 92 Massachusetts avenue, Boston



- Company, 162 Columbus avenue, Boston, 17 Paries - Whitten-Gilmore Company, 907 Boylston street, Bos-
- 102-103 Decator Company, 20 Green street, Cam-
- brioge, Mass. 134, 150 Dr Diss.—Boston Motor Company, 1002 Roylston street, Bos-
- 10 Fekhart-Eckhart Motor Truck Company 116 Milk street Bos-
- 13 Frderal Whitlen Glimore Company, 907 Boylston street, Boston
- 124 Fard-Ford Motor Company. 147 Columbus avenue, Boston.
 26-27 Garford - Garford Company,
- Elyria, O. 105-109 G. M. C.—General Motors Truck Co., 944 Massachusetts avenue, Boston, and Butler Motor Truck Company, 1022 Com-monwealth avenue, Boston.
- 226-227 Grabowsky-Lewis S. Mc-Creary, 183 Pleasant street, Boston.
- tirniam Whitney-Barney Co pany, \$23 Boylston street. Bos-

- Company, 201 Pleasant street,
- 329-330 Mais-R. L. & H. H. Smith, 1008 Commonwealth avenue. Moston Melnigre - Standard Motor
- Truck Compar Company, 9 Harcourt Merenry-Mercury Manufactur-
- Ing Company, Chicago, Ill.
- Ing Company, Chicago, III.

 21 Mergan—Morgan Motor Truck
 Company, Worcester, Mass.

 24-25, 28-29 Mater Wagen—Boston
 Motor Wagen Company, Motor Mart, Bon
- 1-2 Packard -Alvan T Fuller 1089 Commonwealth avenue, Boston.

 14. IN Perriess—Peerless Motor Car
 Company of New England, 660
- Bescon street Boston Beacon street, Boston,
 312-313 Philadelphia — Philadelphia,
 Truck Company, Philadelphia,
 16, 20 Pierce-Aren — J. W. Maguire
 Company, 745 Boylston street,
- Boston,
- 318-329 Pepe-Hartford—Dodge Mo-tor Vehicle Company, Lans-downe street, Cambridge, Mass, 31 Poss Poss Motor Company,
- Detroit 118-120 Res-Linscott Motor Compuny, 163 Columbus avenue. Boston

- 326-327 Victor-Victor Motor Car Company, 75 Haverbill street Boston.
 - Westfield . - Westfield Motor Company. Westfield. Truck Mass
- 4, 7, 11 White-White Company, 228 Newbury street, Boston,

ELECTRIC COMMERCIAL CARS. (Second Week)

- 137-139 Baker-Frank N. Phelps, 17
- Harvard street, Boston, Conple-Genr-W. E. Eldridge, 178 Devonshire street, Boston,
- Detroit-Anderson Electric t'ar Company, letroit.
- 122-123 General Vehicle -General Vehicle Com-Company, 84 State
- 105-109 G. M. C.-General Motors Truck Company, Stt Massachusetts avenue, Boston
- Lansden Lansden Company, Newark, N. J. Watker-Walker Vehicle Com
 - pany, 121 State street, Boston

THE MOTOR TRUCK

STRAM COMMERCIAL CARS. (Second Week.)

- 23 Stunley Stanley Motor Car-ringe Company, Newton, Mass.
- IGNITION EQUIPMENT. 614* American Storage Batters Com-
- pnoy, Albro street, t'ambridge, Muss, hatteries 544 Apple Electric Company, Pay-
- () butteries inn, D., batteries, 616-617* Bi-Mater Equipment Com-
- pany, 177 Portland street, Bos-ton, Salnm hatteries 242° G. C. Blickensderfer tom
- Stamford, Conn., spark plugs, Manufacturing Company, 2 Onune street, Boston, batteries, 4t4* Chumpion Ignition Company,
- Flint, Mich., magnetos, plugs. trie Company, Meriden, Conn Connecticut magnetos, etc 649 Smalley Daniela, Moinr Mari. Boston, Kingston magnetos,
- 4th Detroit Electric Appliance Commany, Detroit, batteries,
- pany, Detroit, batteries.

 500° Edison Storage Battery Com-pany, 195 Boyleton street, Bos-ion, batteries.

 546-547 Electric Storage Battery
- 546-547 Electric Storage Battery Company, Philadelphia, batterina. 620° Watter J, Forbes, 262 Columbus
- avenue, plugs, stc. Boston, magnetos,
- Bright atc.
 Helene Electric Company, Lowell, Mass., Heline magnetos.
 Hois & Bechee, 60 Sudburs street, Boston, electric sup-
- pany, Brookline, Mane, mag-netne, etc. C, S, Knowlea, 7 Arch street.
- Boston, spark plugs, W. H. Leinnd & Co., Worcester, 4122 Mass, colls, etc.
- 563° Moc-Kee Manafacturing Com-I'lain, Boston, Mac-Kae ica spark plugs Marhara Bros., loc., New York
- t'lly, Mea magnetos, 441-442* Chas, E. Willer, 202-204 Columbus avenue, Boston, mag-
- netos, plugs, etc.
 A. R. Mosler & Co., New York
 City, spark plugs,
- 336* Narragament Chemical Com-pany, Providence, R. L. but-
- 540° Antional Carhoo Company, Cleveland, O., batteries, 500° Nuttonal Cell Company, Lans-ing, Mich., Nalional magnetos,
- Pittefield Spark Coll Company, Dalton, Mass., Pittsfield mag-424* netos, ete
- Remy Electric Company, Anderson, Ind., Remy magnetos.
- etc T. F. Hassell & Co., 176 Federal street, Boston, magnetos, ele 348-348 C. P. Splitderf, Inc., Mntor Mart, Ituston, Splitderf magne-
- 521 F. S. Cight & Heating Com-pany, New York City, batteries.
 500* Vesta Accommistor Company. bicago, batterles

TIRES, RIMS, ETC.

- 519-520 tjax-firieh Rubber Company, 15 Park square, Reston, Alan
- 516' Allea Auto Specialty Company, New York City, cases, pressure
- Atlan Chain Compony, Brook lyn N Y, chains
- 537 Tremont street, Boston, Hoston. pumps, compressors

- 56t* Hatevie Robber Company, Ra-tavia, N. Y., Batavia tires 429A* Booth Demonstable Rim Com-pany, Detroit, Booth rims, 616* Boston Anto Gange Company, 8
- Mattheway attent. gauges

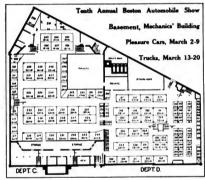
 sop. Boston Tire & Rabber Compass, 152 Friend street, Boston,
- 449 F. Shirles Hoyd, 202 Boylston
- street, Boston, Dorian rims.

 823° Centory Tire Company, 817
 Boyinton street, Boston, tires. Cinyton Air Compressor Works,
- 700 lacronships atreat Boston compressors,
 sip. Smalles Daniels, Motor Mart.
 itoston, Detroit rims.
- Diamond Rabber Company, 867 Boylston atreet, Boston, Dia-
- mond tires 562° Dorine Remountable Him Com-pony, New York City, Dorian
- rime 441 Empire Tire Company, 119 Summer street, Boston, Empire
- Nadanana Tina & Habban Com-

- Hayleton street Boston Miches in tires and rims

 407° Joho Lenia Morse, Franklin.

 Mass. Brown inner tubes
- 535-536 Mots Tire & Hobber Company, Akron, O. Motz tires,
- 552° National Hobber Company, St. Louis, Mo., Tirenew preserva-Pennsylvania Robber Company, Jeannette, Penn, Pennsylvania
- 424° Republic Robber Company, 725 Boylston street, Boston, Repub.
- He tires 363° C. A. Shaier & Co., Waupun. Wis., Shaier vuicanizers
- Shawmut Tire Company, 103 Bedford street Buston, Shawout tires
- mut tires.
 343° Standard Tire Protector Com-pany, Akron, D., tire protectors.
 402-403° Standard Tire & Rubber Company, 104 Portland street, Boston, tires.
- 523-524 Swinehart Tire & Rabber Compacy, Akrnn, O., Swinehart
- elear 304° William L. Tober, 9 Lewis



- pany, New York City, Endurauce tubes 550-55t Federal Robber Manufactur-
- log Company, Milwaukee, Wis., Federal Hres. 527 Firestone Tire & Rabber tompaes, t(5 t'olumbus avenue, Buston, Firestone tires and
- Ptak Habber Company, 811 Boylston street, Boston, Fisk 53% Finh
- tires and rims Jan. I. Gilbers & Bre., Philadelphia, Gibney tires, etc.
- 541-542 B. F. Goodrich Company, 541 Boylston street, Hoston, Goodrich tires
- rich tires.

 544-545 Goodyear Tire & Rubber
 Company, 669 Boyiston street,
 Roston, Goodyear ilres, etc.

 446° Hopewell Bross, 29 Chapel
- street, Newton, Mass., cases 326-527 Kelty-Springfield Tire Compacy, 683 Hoylston street.
- inn, Kelly Springfield tires. 517 Leather Tire tionds Company, Niagata Falls, N worth treads, etc.
- 002-003 Lee Tire & Robber Company, Unnsholtocken, Penn., Lee Hes

- street, East Boston, Mass, tire tools 532-533 United Rim Company, Ak-ron, O., Standard Universal ron,
- 436-437 Lotted States Tire Company, \$62 Boytston street, Boston, United States, Hartford, Conti-
- nental, G & J and Morgan & Wright tires Voorhers Robber Manafactor-log tompany, 24 t'olumbus ave-
- nue. Hoston, tires, etc.
- Sate Werd Chate Tire Grip Com-

LI BRICANTS, POLISHES, ETC.

- Banme's Castorine Company, Rome, N. V., soops and politales Rome, N. Y. soops and polishes. Boroc, Serymore Company, 36 Central wharf, Boston, Colonial
- olla tolombia Labricants Company
- of New York, 116 Broad street. New York City, Monogram oils 5(5) Adam Cook's Sons, for Wash-logton street, Buston Albany

gream

THE MOTOR TRUCK

- 500AA* L. M. Crane & Co., 21 Ollver street, Boston, oils.
 300* Cowell Chemical Company,
 Beverly, Mass., Oxford polishes.
 Sts Joseph Dixon Crachic Campany, John Hancock building,
 Boston, Dixon's graphite lubri-
- cants. Engle Oil & Supply Company, 104 Broad street, Boston, Eagle
- ine No-Karbon oils. 310 Providence, E. L. Harris olls.

 512 Havoline Oll Campany, 35 Central wharf. Boston, Havoline
- 502° George 1. Haws, 889 Boviston
- teorge 4, Haws, 889 Boylston street, Boston, Panhard olls. R. M. Hollingsbrad Company, Camden, N. J., Whiz polishes. Hopewell Bros., 29 Chapel street, Newton, Mass., Paos
- Ideal Oll Tank & Pump Com-
- pany, 146 Summer street, Bos-
- International Acheson Graphite

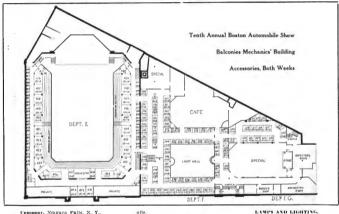
- Wm. C. Robinson & Sons Comoll.
- Rome Soap Company, Rome, N Y., soaps and polishes thoward B. Sawyer Dil Com-pany, 65 Long wharf, Boston,
- Sawyer olls.
 T. R. Shannon, 19 Loraine street, Hartford, Conn., Rapid
- Standard Oll Company, 50 Congrens street, Boston, Polarine
- Teans Company, New York
- City. Texaco oils S P Townsend & Co. Orange
- N. J., grease guns.
- Inderhay OH Company, 74 Batterymarch street, Boston, I'nderbay oils
 - Anenum Oll Campany, 49 Fedstreet, Boston, Mobilolla.
- 301-302 Valvoline Oli Company, 27 State street, Boston, Valvoline

Jersey City, N. J. electric

starter 337° John W. Tador, 35 Congress street, Boston, Tudor.

SPEED INDICATORS

- 522 Haffecker Company, 222 Ellot street, Boston, Hoffecker
- Jones Speedameter Company, New York City, Jones
- Reliance Speedometer Camp-pans, 134 Ellot street, Boston, Reliance, Stewart & Clark Manufacturing
 - Campany, 174 Columbus avenue, Boston, Stewart, Stover-Lang Company, 219 Co-
 - lumbus avenue, Boston, Stover -Long 537-558 Veeder Manufacturing (a
 - pany, Hartford, Conn Veeder, 420° Warner Instrument Company, 925 Boylston street. Boston. Warner Auto-Meter



- Company, Niagara Falls, N. Y., Acheson graphite lubricants.
- Achieson graphite lubricants.

 613 International Metal Polish Company, Indianapolis, Ind., Blue Ribbon polishes.

 427 Chas. F. Kettom & Ca., 254 Colambus avenue, Boston, Invader
- olle Keystone Lubricating Company. 184 Franklin street, Keystone olls.
- 441-442° Chas, E. Miller, 202-204 Co-lumbus avenue, Boston, Miller's Pan-American olls
- 336 Narragamett Chemical Com-pany, Providence, R. I., Meteor sils, etc.
- National Pump Company, Day-ton, O., storage systems. New York & New Jersey Lubri-
- cant Company, New York City, Non-Fluid oils and Motorol, New York, New York City, pol-
- 553º Handall-Faichney Company, 251 Causeway street, Boston, B-line grease guns,

- otte
- 353° Wayne Oll Tank & Pump Cam-pany, Fort Wayne, Ind., Wayne
- storage systems,
 410° White & Bagiey Company
 Worcester, Mass., Olizum, etc. 429B* Wolverine Lubricanta Com pany, ve Brond street, Nev York City, Wolf's head oils. New

SPLE-STARTING DEVICES

- 514° Apple Electric Company, Day-O., Apleo, 621-622 triates Company, 250 West
- street, New York City. Disco. Boston Safely Crank Company, atreet, Buylston
- safety cranking device, 405-400° Cox Brass Manufacturing Company, Albany, N. Y., Cox. Denn Electric Company, Elyria,
- O., Titanic. 415° Detroit Electric Appliance Company, Detroit, electric starter, 505 Hartford Saspension Campany,

- - 514° Apple Electric Company, Frayton, O., Apleo dynamos.
 - 621-622 Ariates Company, New York City, Frank lighting system. 411° Auto Paris Company, 54 Ex-change place, Providence, B. I.,
 - Ford attachments Dean Electric Company, Elyria, O. Prestux dyna-
 - 415° Detroit Electric Appliance Company, Detroit, dynames 500° Edison Storage Batter; Com-
 - pany, 895 Boylston street. Bonton, batteries, 546-547 Electric Storage B Company, Philadelphia,
 - 4268° Enterline Company, Lafayette,
 - Ind., Matchiess lighting system. G. C. A. Manafacturing Com-pany, Pittefield, Mass., lighting enuipment
 - Gray & Davis, Amesbury, Mass., Gray & Davis dynamos, 664° Motor Specialties Company, Motor Mart, Boston, flash lighters.

THE MOTOR TRUCK

- 236 Varraganaett Chemical Com-pany, Providence, R. L. lamps nd lighting systems,
- 543 Remy Electric Company, Anderson, Ind., itemy magneto lighting system.

SHESSILLING DEVICES

- 405-406° Cox Brass Manufacturing Company, Albany, N. Y., horns. 619° Smattey Daniels, Motor Marc, Roston, Waymaker.
- Denn Electric Company, Elyrin,
- O. Tub. 447-448° timbriel Horn Manufactur-log fompany, Cleveland, O.,
- Lovell-McConcell Manufactu ing Company, Newark, N. J., Kinxon
- Kiavon,
 428* G. Piel Company, Long Island
 City, N. Y., Long horn.
 3553* Handnil-Fnichney Company, 251
 Causeway street, Boston, Jericho and Jubilee.

TOPS AND WINDSHIELDS.

- 325° (clumbia Tire & Top Company, 1014 Commonwealth avenue, Boston, windshields. 405-406 Cox Brans Manufactoring Company, Albany, N. Y., wind-
- 619 Smailey Daniels, Motor Mart, Boston, Borens windshields. 447-446° Gabriel Hora Manufactur-ing Company, Cleveland, O., windshield cleaner.
- Pantasote Company, Il Broad-way, New York City, top ma-

CARBURETONS, ETC.

- 432 S. F. Howner Company, Inc., 1(1 Milk street, Boston, Bowser storage systems.
- 445 C. R. G. Munufacturing Com-pany, Saugus, Mass., C. R. G. 511' Dover Stamping & Manufactur-
- Dover Mamping & Manufacturing Company, Cambridge, Mass., cans. funnels, etc.

 Holiser-Cabot Electric Company, Brookline, Mass., New-comb carburetors.
- Ideal Oll Pump & Tank Com-pany, 146 Summer street, Ros-ton, ideal storage systems
- Vational Pump tompany, Dayten. O. storage systems
- 422° Stromberg Motor Devices Compuny, Motor Mart, Stromberg carburetors. Bonton,
- 353° Wayne Oll Tank & Pamp Com-pany, Fort Wayne, Ind., Wayne torage systems.

SHOCK ABSORBERS, ETC.

- 342 Arme Torsion Spring Company, 21 Cambridge street, Boston, Acme torsion springs,
- Air *boek Absorber Company, 585 Boylaton street, Boston, shock absorbers.
- 621-622 tristos Company, New York City, Mondex shock absorber 504* Connecticut Telephone & Elec-tric Company, Meriden, Conn., Connecticul shock absorber.
 - 805° Erest Flentje, 1613 Cambridge street, Cambridge, Mass., Flentie shock absorber.
- 447-445' Gibriel Horn Manufactur-ing tompany, Elevetand, O., Foster shock absorber and Gabriel rebound snubber
- 805 Hartford Suspension Company, Jersey City, N. J., Truffault-Hartford shock absorber.
- 303* Modern Auto Appliance Com-pany, Chatham, N. V., Little Steeraman spiral springs

- JACKS, WRENCHES, ETC.
- 359 Ames Anto Jack Truck Company, Franklin, Penn., jacks 513° Aubara Anto Pomp Company, 537 Tremont street, Boston,
- tacke 411° Anta Parts Company, 50 Ex-change place, Providence, R. L., special Ford 1001s.
- 243-244 Chandler-Farquhar pany, 34 Federal street, Boston, machine tools
- 435 Coes Wrench Company, Worces-ter, Mass., t'oes wrenches.
- 357° Detroit Tool Sales Company, 60 State street, Boston, 6-in-1 1001
- Hartford Suspension Company, Jersey City, N. J., Hartford auto-jacks, 116' Lovell-Met'onnell Manufactur-
- ing Company, Newark, N. J., Raiswell Jacks, 345° Frank Momberg Company, At-tleboro, Mass., socket wrenches
- 804° Motor Specialtics Company, Motor Mart, Boston, Jacks.
- 246° Standard Wrench & Tool Com-pany, Providence, R. L. Fitzall wrenches.
- 304* Wittiam L. Tobey, 9 Lewis street, Boston, fire tools,

GENERAL ACCESSORIES.

- 616-617° Bl-Motor Equipment Company, 177 Portland street, Bos-
- 449 P. Shirley Boyd, 902 Boylston street, Boston.
- 615° t'eward Anie Supply Company, Motor Mart, Boston. 619. Smalley Daniels, 23 Motor Mari,
- 612° C. J. Downing, 1777 Broadway, New York City.
- 626° Walter J. Porbes, 243 Colum-bus avenue, Beston.
- 349, 464° Hub Cycle Company, 40 Portland street, Boston.
- 315 Lunt, Moss Company, 43 Mar-ket street, Boston,
- 441-442° Chas. E. Miller, 202-204 Co. lumbus avenue, Boston 611° Motor Accessories, Inc., 742 A
- Boylston street, Hoston,
- 425° Post A Lester Company, 222 Columbus avenue, Bos
- 601° T. F. Hussell & Co., 176 Federal street, Boston
- 400.401 Standard Auto Supply Com-puny, 101 Portland street, Box-

MISCELLANEOUS.

- ston street, Boston, dictionartes. 994AA* Actua Life Insurance Com-puny, 4 Liberty street, Boston.
- 364 American Brass Compony, 22 John street, New York City,
- 3564A* American Technical Society, 144 Iligh street, Hoston.
- 440 A 1 Alumium Solder Company, 199 Berkeley street, Boston. aluminum solder. 305-306° Antogenous Welding Com
- pany, 41 May street, Springfield, Mass, welding equipment, 51% Butdwin Chain & Manufactur-
- ing t'empany, Worcester, Mass., transmission chains, etc. 356° Boyd Motor Company, 27 Stan-
- 508 to Walter S. Bucklin, 30 Kilbs

- 341 Ctark Foundry Company, Rum-ford Falls, Mc., castings,
- 537 Wm, Cramp & Sons Ship Bullding & Engineering Wor. Philadelphia, special metals.
- Denne Steam Pump Company, Heine Steam though pumps
 - 239, 352 Duren & Kendall, 34 Sumstreet. Boston, vacuum
- 339-340,345-346* Fairbanks Company, 34 Pearl street, Boston, motors. 212° Frontier Iron Works, Buffalo, N. Y., Frontier aerial motors.
- 562 A. A. Billman Aulo Supply Com-pany, 98 Massachusetts avenue, Boston, lacquer work.
- 319° George N. Holden, 141 Massa-chusetts avenue, Boston, Indian motorcycles
- * International Automobile Asso-elation, Old South building, Boston, membership campaign. ... * Jackson & Co., 126 Tramont
- street, Boston, fur clothing. 300H. J. J. Kelleher, 610 Columbus avenue Boots
- 362° Margaret E, Knight, Charles and Hollis streets, South Framingham, Mass., new motor,
- 4504.4 Millhary Steel Foundry, Millbury, Mass., steel castings, Moore-Smith Company, 25 Devoushire street, Boston
- clothing. ... * Morrison Ricker Munufacturing
- Company, Grinnell, In., Grinnell 328° Antional Tabe Company, Pitts-
- burg, Penn. tubing
- 356HH* A. E. Casanity Company, 40 Kilby street, Boston, Insurance. 235-236° Norton Company, Worces-ter, Mass., grinding wheels, etc.
- 328 P. G. H. Bennett & Co., 27 Lansdowne street, Bonton, ma-
- chinery 307 Pyrene Company of New Eng-land, 116 Federal street, Bos-ton, fire extinguishers
- 344 Raymond Engineering Com-pany, 55 State street, Boston.
- 33%, 347 Wilton E. Rogers, 420 Tre-
- ment building, Reston-... P. R. Rose, 62 St. Germain street, Boston,
- 605° John A. Sniman, 17 Bromfield street, Boston, name plates and monograms
- 358 Sheldon trie Company, Wilkenbarre, Penn., axtes and parts.
- 686-647° Sewell Sushion Wheel Company, Detroit, spring wheel
- 213° S. K. P. Hall Bearing Company, 50 Church street, New York 50 Church street, City, ball bearings
- 530-531° Standard Roller Bearing Company, Philadelphia, Penn.
- 443** Steel Specialties Company, [0] Tremont street, Boston
- 550° Valentine & Co., 74 Pearl street, Roston, Varnishes
- 502 Watpole Rubber Company, 154
- street, Hes 451° Waltham Watch Company, 240 I seven white attest Boston
- 516" Whitney Manufacturing Commission chains, etc.
- 514 Willinker thain Treed Com-pany, 12 Pearl street, Boston
- 450: Edwar T. Ward & Sons, 25 Pur-

*ladicares exhibitor will show one Google week only

NEWS OF THE COMMERCIAL VEHICLE INDUSTRY.

Lanchester-Daimler Worm Drive to Be Produced in America—Pertinent Information Concerning Production and Selling—Truck Shows in Smaller Cities.

Coincident with the return of W. C. Baker, president and mechanical engineer of the American Ball Bearing Company, Cleveland, O., from an European trip comes the announcement that this concern has supplemented its present product by the addition of a complete line of worn driven axles, in which the imported type of Lanchester-Bailiter worm and worm where will be utilized. In this connection, it is remembered that Mr. Baker designed and constructed the first level sear driven axle to be used in an automobile in this country. His adoption of the worm drive is expected to bring about as important consequences in the Industry as his action with reference to the bevel gear at a time when its use was considered minousable.

Of course, the worm drive situation is by no means analogous to that of the bevel gear at the time mentioned. This system of final drive has been in successful use in America for more than a year, and the result of the recent shows indicates that it is to be employed even more generally in the future. Interest in worm construction is therefore decidedly keen just now.

The Lanchester type has been most thoroughly tried out under all sorts of conditions and is widely used by a number of prominent foreign truck manufacturers. It is the ber of prominent foreign truck manufacturers. It is the Nr. Lanchester of study and experimentation on the part of Nr. Lanchester of the Lanchester bottor Car Company, Covernentry, England, and the Daimler and Lanchester companies or which have been using worm drive for the past 10 years, which have adopted it exclusively on their entire output. It also have adopted it exclusively on their entire output. It also has found recognition in such well known pleasure cars as the Minerus, Pumbard and others,

The design is that commonly known as the enveloping or hour glass type. However, it is distinct from all other from all other from all other from all other has been able to perfect special machinery and custers when are claimed to eliminate sill hand finishing operations and the other hand to leave the worm and gear absolutely true as to tooth reas to be seen the sum of the state of the state

"While abroad" says Mr. Baker, "I investigated the various other types of worms and gers in use, and was sepacially impressed with the Lanchester type. As the state of properly monsting, as as to result in risklidy holding the worm and geer in the axle construction is of vital importance, this point received careful consideration. I was grait met the distribution of the daptation of the Lanchester worm in our axis construction without modification or changes. The two harmonize perfectly."

Mr. Baker was accompanied on his trip by Charles E. Davis, general manager of the Warner Gear Company, Muncle, Ind., and this concern has contracted with the Daimler company and Mr. Lanchester for the exclusive risk to the Lanchester worm and worm wheel in the United States and Canada.

TO MAKE ELECTRIC DELIVERY WAGONS

William E. Pratt of the Pratt Manufacturing Company, Jolled, Ill., has purchased the personal property of the Economy Motor Car Company of that city, and has submitted a bid for the real estate, which probably will be accepted. It is understood that Mr. Pratt will operate the plant for the production of electric vehicles of the light delivery and roadster types.

During the past year W. R. Everett, formerly president

of the Economy, company, has developed these describe which have given excellent which have given excellent which have given excellent hands of purchase by Dwing to unsettled unatten regarding the plant, the plant, the plant, the statements, but it is known that the cars will be priced moderately.

DECATUR TRUCK GOING TO GRAND RAPIDS.

According to a disputch from Decatur, Ind., a movement is on foot to remove the plant of the Decatur Motor Company, maker of Decatur "Hoosler Limited" trucks, from that city to Grand Rapids, Mich. This Information indicates that Grand Rapids capitalists are prepared to indicate that Grand Rapids capitalists are prepared to invest \$100,000 in the concern, providing this move is made.

PRODUCES ELECTRIC OMNIBUS.

The first vehicles produced by the Electric Omaibus Corporation of New York City, which was incorporated about six months are, has been placed with Carson, Pitte, Scott & Co., Chicago. These vehicles are designed by C. J. Field, who has been identified prominently with electric railroad engineering for some years, and are equipped exclusively with the Edison batters. The plant is at Troy. N. Y.

The 'buses mentioned are four in number, each with scaling capperly for 18 passengers and of the pay-as-youenier type. The driver acts as conductor as well, and collects the fares. It follows that the entrance is at the front, and it may be added that the driver is completely enclosed.

Part of the batteries are placed under a small hood in front and the remainder are under the passenger's seast. The geering provides a maximum speed of 12 miles an hour, and with short boostige charges a tend of each day's run, a daily mileage of 80 is obtained. The motor is a General Electric 60-volt series wound, and drives direct through a cardian shaft to jacksbaft, final drive being by

The controller is operated by means of a lever on the steering column, and is thoroughly protected against short circuiting. Two independent braking systems are provided, service members acting on drums at the extremittes of the jackshaft and emergency on the rear wheels. Tires are 34 by 3.5 inches, dual, in the rear, and 32 by 3.5, single, in front.

WORCESTER WANTS DART COMPANY.

The Board of Trade in Worcester, Mass., is taking active interest in an endeavor to secure the plant of the Dart Manufacturing Company, maker of Best commercial vehicles, now located at Waterloo, i.a. At a recent meeting, the directors definitely decided to lastic the company to locate list Eastern factory in that city and to secure \$100,060 of Worcester capital, which will be half of the \$200,000 increase contemplated, making the total capitalization of the concern, \$325,000.

It is understood that If the proposed factory is located in Worcester It will be considered the main plant and will offer employment to between 400 and 500 workmen at the outset. This is based upon the assertion that the company now has orders for 4000 cars to be delivered during 1912.

FORD MOTOR COMPANY TAKES IMPORTANT STEP.

The important hearing which the opening of the 'tanama canal will have upon American export luminess is beginning to be realized by the motor car industry. As a result, California and other Pacific Coast status indoubtedly will be included among the autonobile manufacturing centres in the very near future. One of the first concerns to take this arej is the Pord Motor Company of Detroit, which is seeking a site for a branch factory either at Los Angeles or San Francisco.

James Couzens, secretary-treasurer of the Ford company, has been on the coast during the past month, maktic will cost approximately \$300,000 and will give employment to at least 800 workmen at the start. The construction and equipment will be modern in every particular, and the capacity will be about 5000 cars a year. As the Ford company manufactures both piessure and commercial vebiles, both types will be constructed in the California plant.

The main building will be 500 by 500 feet, and will be of relaforced concrete construction throughout. Electric power will be employed to operate the machinery. Motors will be ablapped to California from the plant on Long island, and it is anticipated that the l'anama cana will aid materially in the ablapment of these. In addition, it is expected that the opening of that canal will mean a largely increased merchant marine, plying between the l'nited States and the Par East, and the plans of the Port company include the shipping of large consignments to Hawail, Japan and the Asiatic Continent.

CHANGES PLANNED BY SMITH COMPANY.

According to a disastich from Milwaukee, Wis, all shares of the A. O. Smith Company of that city, not at present helds by those members of the concern actively engaged in the manufacture of automobile parts and forstines, will be purchased by persons intimately connected with the corporation. The stock affected by the transfer is salued at about \$300,000, 000, while the total capitalization of the company is \$1,-

It is announced that the change in stockholders, which has been contemplated for some time according to the dispatch, will be made in order to effect a more compact organization. No immediate changes in the extent or control of the corporation are in view, it is said, and the policy of the management will remain the same. The information is of interest in view of the recent announcement of a five-ton runck hearing the Smith name.

CANADA'S MILLION DOLLAR CONCERN.

The Gasejectric Motors, Lid., St Thomas, Dut., has been incorporated at Toronto with capital of \$1,000,000. While be plant of the concern are still unanounced, it is understood that motor cars will be produced in which electricity will be generated by a gasodine engine on the ear itself, the power being applied to the road wheels by separate motors leverted in the hubs.

NEW TAXIMETER PRESENTS RECEIPT.

Walter Lewin of San Prancisco, Cal., has perfected the Lewin taximiser, which is to be placed in the market by the Pacific Taximeter Company, recently organized in that city, in addition to the usual functions of a device of this nature, the new product will present the customer with a receipt for the fare node. In effect, it will keep it sown books and

climinate the necessity for frequent inspection by the operating company.

The meter is built in two units, called the registering and duplicate ticked device, resolvetlyst. The registering portion is operated by a series of gears thrown into and out of mesh by the tariff lever, which is in turn coupled up and directly connected to the registering wheels. The duplicatticket device is that portion of the meter which is monnied in the cover and can be removed from the instrument by unlocking a Yale lock.

There are two reeds for the duplicate and original ticket, which roll over guide rotters parallel with the face of the registering wheels when in position, the duplicate ticket being rolled again on a drum and the original being discharged through a chute in the side of the meter. On the same cover the whole of the stamping device is mounted somewhat on the principle of a typewriter hammer, each character on the registering wheels having a separate hammer, that imputing on the left.

SWETLAND HEADS COMMER DIRECTORATE.

H. M. Swetland, who is well known in the industry because of his connection with its publications, has resigned as president of the Class Journal Publishing Company, New York City, to become chairman of the board of directors of the Wyckoff, Church & Partridge, Inc., maker of Commertracks in America, under license from Commercial Cars, Idd, of England.

ADOPTS INTERNAL GEAR DRIVE.

Incorporated recently to manufacture a light delivery car to sell at a popular price, the General Industrial & Manufacturing Company, Indianapolls, Ind., announces the adoption of the Internal gear drive. The model in which this will be employed is a 1500-pound waxon, designed for general use, which is expected to appeal to a jurge class of purchasers.

Among the advantages claimed for this type of drive are the complete enclosure of all working parts, arrying the load on a solid aire, and transmitting the power by an independent live aire. One of the most interesting examples of this type of ear, is cited in the vehicles used on the Fifth awence omition line in New York (1ty, which have been in use for a long period. Others of a similar design have been in successful service in Raigand and Germany. The German stray has favored this type, and has many such vehicles in ouercastle.

ANOTHER TRUCK CONCERN IN WISCONSIN.

Annoncement Is made of the Incorporation of the Piccians Motor Truck Company, Racine, Wis., with capital or \$125,000. This is not a new concert, in the strict schee of the word, and the product will not be entirely new, intomuch as those who compiles the company have been enmaged in the production of commercial cars in a small was for some time.

Early in the listory of the industry, C, B and F, H, Piggins of Raine suggest the manufacture of gasoline cogines and specialties. Three years aga they become makers of trucks and pleasure cars, and several of these have been giving sphendid sutifaction in service. The new plans cut for enlarged factors and machine shops, so that the entire attention may be desired to the production of connucredal vehicles on a larger scale.

Tily 2nd by Google

GENERAL MOTORS BEGINS EDUCATIONAL CAMPAIGN.

Gleeson Murphy, who is recognized as one of the most expert commercial vehicle salesmen in the country, has become vice president of the General Motors Truck Company. Detroit, and assistant to President Neal of the General Motors Company, which is the parent organization of the truck concern. Mr. Murphy has spent much time in investigating industrial transports in service and has a thorough knowledge of what should be expected from a vehicle of this type. Under his management the company will undertake a nation-wide educational campaign, in which the results of his investigations will be instilled into the minds of hundreds of business men throughout the country.

Briefly outlined, the particular reasons why business men should use motor trucks are set forth by Mr. Murphy as follows: Because they will increase the efficiency of the delivery system, give prestige, belp increase business, enable a large territory to be covered in a given time, work every day in the year, and will not be affected by the elements, heat or cold. In addition, he contends that the efficiency of the entire organization is judged by the manner in which the business man is able to deliver goods.

Based upon the fact that previous to Jan. 1, 1912, \$60,-909,000 worth of trucks bad been sold since the incention of the industry, Mr. Murphy suggests that business men



lifeeson Murph), Vice President, General Motora Truck Company,

owing to the wide choice offered in the matter of body designs and mechanical equipment. Economy is taken care of in the suggestion that the motor truck takes the place of two or three teams, depending targety upon the routing and extent of the delivery system in question. As a final feature, it is noted that the mechanical conveyance will carry loads and negotiate hills impossible for horses to undertake.

That the motor

ly all lines of business.

NEW TRUCK FROM NORTH CAROLINA.

Another instance in which a well known manufacturer of wagons bas been replaced by a new concern which will devote its attention to the production of motor trucks, comes from Charlotte, N. C. A few years ago the Wadsworth Wagon Works of that city, which had been engaged in the construction of wagons for many years, was succeeded by J. L. Owens & Son, which became interested in the automobile industry, through the manufacture of tops and uphoistery, in addition to its large business of painting bodies, etc.

This latter concern now has been reorganized as the Owens Wagon & Automobile Works with capital of \$50,-000. It appears that its predecessor had been experimenting with the construction of commercial vehicles during the past year, and is ready to place in the market at least one model. The officers of the new concern are: President, J. L. Owens; vice president, Frank O. Owens; secretary and treasurer, Skinner S. Alston,

HEWITT WITH MACK AND SAURER.

The Hewitt Motor Truck Company, which was organized shortly before the New York show season began, has become amalgamated with the international Motor Company of New York City, which already was in control of the Mack Bros. Motor Car Company of Allentown, Penn., and the Saurer Motor Truck Company of Plainfield, N. J. Negotiations are said to be under way looking toward the purchase of at least one other concern, a prominent maker of electric vehicles, but no definite information ban been vouchsafed by those interested.

it will be remembered that the Hewitt line is one of the oldest in the industry. Something over a year ago the Metzger Motor Car Company of Detroit purchased the original company, principally for the purpose of acquiring a Selden patent license. Hewltt trucks, ranging in capacity from 1500 pounds to 10 tons, have given excellent satisfaction in the hands of users since the first vehicles were placed in the market, and it caused little surprise when it was announced in December that the original people had formed a company under the old name to take charge of their production again,

It has been known for some time in the industry that the international Motor Company was anxious to increase its holdings, particularly in the matter of offering a wide variety of truck sizes. The rumored purchase of the Hewitt concern early in the month proved to be premature, but the official announcement was made Feb. 28. The new arrangement goes into effect March 1.

WAGON MAKER TO PRODUCE TRUCKS.

Although engaged in the production of wagons for a number of years, C. T. Woolson of Riverton, N. J., has been interested in the sale of automobiles for the past five years. Recently be was instrumental in the organization of the Woolson Auto Truck Company, which will produce a two-ton vehicle to sell at a moderate price. Announcement is made that the first truck of the Woolson design will be completed and on the road within 30 days.

WILL EXPLOIT ELASTIC WHEEL.

The American Elastic Wheel Company of 11 Broadway. New York City, has been organized for the purpose of exploiting the Feroci wheel, of Italian origin, although protected by American patents. It is claimed that a number of these wheels have been utilized on army trucks by the lialian government and that these have given excellent satisfaction. The device employs a series of rubber buffers and spiral steel springs. The officers of the concern are: President, Walter D. Ward; vice-president, Caesar Feroci, the inventor, and treasurer, Frank Ward.

SPLENDID INTEREST IN BALTIMORE'S TRUCK DISPLAY.

As an indication of the increasing interes bitting displayed in the use of commercial vehicles in listinore, it is remembered that but four makes of trucks were shown in last year in connection with the local automobile show. This year the dealers of that city the application of the Automobile Club of Maryland, Feb. 26-28, in which more than 70 models were displayed by 22 agencies.

The Fifth Regiment Armory was beautifully decorated for the pleasure car show, which immediately preceded this event. in addition to the vehicles on display within the hall, most of the dealers had demonstrators outside, and foil opportunity was afforded for complete investigation of the problem of mechanical haulage. The exhibits may be described briefs as follows:

Atterbury Motor Car Company of Maryland, three and five-ton Atterbury; Calishan Bros. Company, Morgan, twoton delivery, five-ton truck and three-ton chassis; Chase Motor Truck Company, one Chase truck; Consolidated Gaa Electric Light & Power Company, two and three-ton vehicles of company's own make; Enterprise Fuel Company, three two-ton Gramm trucks and three-ton Gramm coal dumper; Everitt Auto Company, one and three-ton trucks on Everitt chassis; Ford Auto Company, Ford delivery wagon; Fosa-Hughes Company, five-ton Pierce-Arrow truck and stripped chassis showing worm drive; International Harvester Company, three 1000-pound international delivery wagons; international Motor Company, 4,5-ton Saurer, one and two-ton Mack trucks, three-ton Mack brewery truck, four-ton Mack hose wagon, and five-ton Mack self-dumper; Keily Motor Truck Company, one and three-ton Kelly: Lozier Salea Company, five-ton stripped Lozier chassis; Mar-Del Mobile Company, two-ton Packard stake wagon and three-ton chassis: Mount Vernon Motor Company, 1.5-ton Autocar and stripped chassis; Neely & Ensor, four Alco trucks ranging from two to five tons, and two Lippard-Stewart vehicles; Norwood Bros., inc., three-ton Seitz stake truck, one-ton Scitz chassis, and 1000-pound Lincoln wagon: Oakland Motor Company, three 1.5-ton Federal trucks: George R. Snodeal, 6.5-ton imported Commer chassis; Standard Motor Car Company, 1000-pound Cadiliac chassis; Stoddard-Dayton Auto Company of Baltimore, three-ton Sampson chassis and 1000-pound delivery wagon of same make; White Automobile Company, 1500-pound wagon, three and five-ton trucks and three-ton chassis, all of White make: Zeil Motorcar Company, five-ton Peerless chassis and 1500-pound Chaimers delivery wagon.

CINCINNATI'S COMMERCIAL CAR SHOW.

For the second time in the history of the Clacinnati. Automobile Desirer' Association a special motor track display was held in Music Hall, Clacinnati, O., during the high play was held in Music Hall, Clacinnati, O., during the car whow of the previous week, and the name decorations were maintained for hoth exhibitions. The attendance was vern larger than last year, and it is understood that much business was transacted.

Among those who made display were the following: Leyman Bulck Company, Mark, Saurer, Cithens Motor Car Company, Packard, R. C. Crowthers, Alco, Veerac; C. S. Motor Truck Company, Pitted States; Hanauer Asicomobile Company, Pierce-Arrow; Pattedhoff & Braukmann, Haffeld; Dr. H. C. Wendel, Dorris; Haberce & Co., Clinc; Clicinnati Automobile Company, Peeries, Pope-Harford; International Harrester Company of America, International; Schach Motor Car Company, Schach; Chiesco Phesimatic Tool Company, Little Giant; Pischer Auto & Service Company, Speedwell; Herold Motor Company, Rec, Miller DuBrel & Peters, Avery, Ideal; Otto Armieder Company, Rec, Armieder; Cincinanii Motor Truck Company, Federal Glow Electric Company, Glowicke; Willberding & Brandewedle, Modern; F. B. Williams Commany, Sandusky.

MORELAND TRUCK FROM CALIFORNIA.

Claiming to be the third city in the country, with refereace to amber of commercial cars in active use, and realizing that California business men are alive to the possibilities of increasing the scope of their business by a reality effective delivery system, Los Angeles, Cal., is taking active interest in an effort to become a large automobile madufacturing centre. Among the recent announcements is that of a new truck concern, the Moreland Motor Truck Company of that city.

Walter L. Moreland, manager of the company which the bears his name, is a pioneer in the California automobile bears his name, is a pioneer in the California automobile bears his name, is a pioneer of with the first concern to industry, having been connected with the first concern to the bears cars in that commonwealth. The models are manufacture pleasure ears in that commonwealth the models are anging from 1.5 to 10 ton apacity. Several stread have given good service in the hands are the service of their owners already have already and the service of their owners are manufactured in the factorized that the service of the company as Wilhards and Several Mania arrests.

PRODUCING GASOLINE RAILROAD CARS.

The Marion Motor Section Car Company, Marion, Ind., has been incorporated with capital of \$1300, 900, for the production of a gasolike rallroad inspection car, invented by W. Owrth of Chiesco. The Worth brothers have been making this vehicle in small quantities for some time, but it became evident recently that additional capital would be user-seary in order to keep abreaut of the orders. Stockholders in the Indiana Auto Parts Company of Marion became interested in the proposition and the organization of the new concern resulted.

The car is equipped with a 29 horsepower gooding easign, and has capacity for carrying 16 persons and hauling three trailers, making a total weight of not less than 50,000 pounds, at the rate of 25 miles an hour. It is claimed to have all the speed and ability of a steam becomotive, either forward or backward, up to 40 miles an hour, and without the use of a gear in its construction. The weight is light, and nickel and other speedal series are used throughout.

The factory will be located in Marion. The work of drawing plans and specifications has been going on for some time, and the company is ready to produce from 12 to 15 cars daily. It is understood that railroad companies are anxious to take all that can be manufactured.

MARYLAND FIRM ENTERS TRUCK FIELD

Helicving there is a decided market for a light delivery wagon of the proper construction, the Kuhner Enginering Company, Oxford, Md., has turned its attention to the production of trucks of this character. The concern has been producting at the character. The concern has been producing automobile motors for some time past, and she here producing automobile motors for some time past, and to try has a tidewater frontage, and is 50 by 160 feet. The tory has a tidewater frontage, and is 50 by 160 feet. The officers of the company are. President, H. E. Kuhner; vice officers of the company are. President, Alexis G. Paacault; secretary, George M. Wingard; treasurer, William R. Shannahan.

While and by Google

THE A B C OF MOTOR TRUCK OPERATION.

A Simple Exposition of the Principles Underlying Operation, Maintenance and Repair of All
Motor Driven Commercial Cars, Describing Details of Components.

Part XVI—Outlining Principles of Selective Type Transmission.

By C. P. Stinttnek,

R FFERENCE has been made to the planetary form of transmission which has many advantages, inasmich as it is a device especially adopted to being handled by the most inexperienced without liability of damage. It possesses a feature also shared by the sliding goar system, that of furnishing a direct drive on the lith speed, this being brought about by locking the high speed clutch disc and by the transmission revolving as a unit as previously explained. Its greatest drawback lies in the production of but two forward speeds and a reverse. Although providing a quiet and efficient means of transmitting energy to the

cone is in place, the pressure between the fingers and the clutch disc locks the gear drum to the shaft and causes the whole to revolve as a unit.

The high speed may consist of a cone, or a number of dincer faced with three, or absence and wire cloth as friction facing, and provision is made for adjustment by servering the spiler carrying the bell cranks so that they will be brought closer to the disc or cone. The braking bands are lined with various materials and to derive efficiency those members must be so adjusted as to grip firmly when in service, but not blind when the high speed is employed and

the transmission revolving as a unit. Should undue friction be set up it will act as a brake when the vehicle is being operated on the direct drive.

The pianetary transmission is made in several forms but the basic principles upon which it operates are similar. Control of the three speeds may be by pedai or iever. For example, the low speed and the reverse clutching members may be actuated by a separate pedal and a band lever be utilized to operate the high. Some forms may provide for operation by pedals alone. It is obvious that this type of transmission has its advantages, among which may be mentioned that the reverse may be employed as a brake in the event of the usual members failing to operate. A four-speed planetary transmission would be compilcated, difficult to construct as well as apply, and to provide for more

Second Speed Finion Inited Speed Finion
Low Speed Finion
Reverse
Finion
Reverse
Idler

Mainsmot
Idler

Mainsmot
Idler

Mainsmot
Genr A

Genr B

Genr B

Genr GStown in High)

Fig. 65—Hepicting the Components of a Four-Speed Gearbox of the Selective Form—The Third or Hieret Helve Member is Shown in Engagement.

traction wheels when the high speed is utilized, there is more or less noise attendant upon the use of the other pears after a time. It is very compact, occupies but little roam, and when the gears are enclosed in oil tight resinus, and these packed with suitable inbricant, both wear and noise are climinated to a large extent.

At Fig. 68 in depicted a conventional form of planetary transmission utilized on mechanical transports with part of the casings removed to show the gears and the arrangement and location of the brake drain. These drain menbers revolve and stopping the motion of the by means of a solitable brake band will give a slow speed forward, while clutching the other drain will bring about a reverse movement. As the gears are continually in most the sweed changes may be made easily and all danger of stripping the gears is eliminated. Owing to the utilization of brake bands, the low and reverse ratios are obtained in a gradual manner even if they be objected by an inexperienced driver.

To obtain the high or direct drive the high speed clutch disc is forced against the drum casings by small fingers or bell cranks, being expanded by a cone member. When the than two forward specifs the sliding gear is employed. This permits of three or four forward specifs and a reverse, according to the design, thereby giving a widerrange of specif gears, and permitting the operator, nonter what road conditions he may encounter, to secure from the motor a very economical expenditure of power.

Sliding gear arrangements may be divided into two classes; namely, progressive and selective. The selective type differs from the non-selective inaminch as it permits the choice and use of any set of speed gears instantly, without passing through literanglial gears. In the use of the non-selective type, should the var be running on the third or direct speed, and the operator desires to change to the tirst, he is compelled to disengage the third speed, and to enagage and disengage the second before the desired low may be reached. This is overcome in the selective type, where the operator merely disengages the speed gears in use and engages the gears desired without being required to consider intermediate members.

The components of a sliding gear are outlined at Fig. 65, which depicts a conventional type of selective transmis-



Fig. 96... Showing Layabat) of Silding tiene Transmission, Shifting Member and Jaw Clutch, Which in Fitted with Keyways to Silde on Mainsbatt,

sion having four speeds forward and reverse. The engine and clutch have been previously described and their method of operation made clear. Upon the mainshaft of the gearbox, which really is a continuation or extension of the engine shaft, are carried a number of gears, these corresponding to similar members mounted upon another shaft parallel to the main member and in proximity to it. The second is termed the layshaft and it will be noted that it is fitted with a gear which is in constant mesh with another and smaller gear fixed to the main shaft. Upon the latter, which is round, although it may be of square design, are located movable gears, this action being secured by providing four milled keys which fit into four slots cut through the centre of each gear. This arrangement may be considered as solid on the shaft, inasmuch as the keys and shaft are one plece.

By reason of the keys on the shaft and the correspondling holts in the gears, the sliding year is one that may move longitudinally on the shaft, and at the same time be so held by the keys that it must revolve uniformity and constantly with the shaft. At Pls. 68 is depicted the main shaft with keys, also a jaw clutch or shiftling member with keysays outlined, and it is obvious that when this is fitted to the shaft it practically forms a solid, although allocable member. In other words, it has a free movement along the shaft when moved by means of a color and yoke, to but is me more independent of the shuft in the matter of revolution. Than if the shuff can gear were use along.

The grars upon the layshaft are fixed, as will be noted in the illustration, and those members are revolved by means of a gear in mesh with another on the main shaft and these are termed the constant mesh gears. Further more the gears on the lay and main shufts are so smooth

kilders Cenr

that but one pair may be in mesh at a time; that is, care is taken in spacing the different members so that there will be no interference or striking between gears which do not form pairs and are not intended to mesh.

The number of gears fitted dipends upon the speed employed and when four forward are utilized as in the gearbox at Fig. 65, the main shaft is equipped with three shifting members which gives the reverse, lowest and intermediate speeds. The other shifting member shown in the direct drive position, which is the third forward ratto, also serves for the fourth speed, which is higher than the direct drive. The constant mesh gear

driven by the engine drives the constant mesh scar on the lagshaff and the former causes the latter to revoke lagshaff and the former causes the latter to revoke When the shifting member is moved from the direct drive position so that it meshes with the largest lagshaff seek the the main shaft rotates at a higher speed than the constant when the same of the same seek of the sam

If the operator desire to change from the direct to the second or literandiate speed, the citeth is disengaged and by mean of a shifting collar which is actuated by the gear shifting lever, the shifting member fitted with the Jaw chutch is moved out of engagement and another movement of the lever moves the gear II into engagement with the sevent speed pinion on the layshaft. If the low be desired the gear A is moved backward into mesh with the low speed pinion. As previously explained, with the selective type of transmission a direct change may be made from one speed to another a the will of the operator.

Assume that the driver desires to move the vehicle backward, an operation involving the use of the reverse mechanism. This is operated by the same lever that actuates all forward speeds, the only difference being that the gear on



Fig. 67.—Genebux of Three-Speed Selective Type, Depicting the Lear Shifting Mechanism, Operated by Hand Lever, Attached to Loner Half of Transmission Case.

part of the main shaft to the lasymaft, the latter revoices in an opposite direction. When this motion is transmitted from the lasymaft back to the rear part of the main
shaft, the direction of rotation is again reversed, so that
the rear part of the main shaft revolves in the same direction as does the forward section. If, between the gear on
the lasyshaft and main shaft, an intermediate pinion be interposed, the latter will revolve in exactly the same direction as does the forward each of the main shaft, and if the
intermediate pinion be meshed with another on the rear
part of the main shaft, the motion of the latter will be
similar to that of the lasyshaft, and directly opposite to the
direction of the forward part of the main shaft. Thus, by
the linervention of a reverse idler, a backward movement
of the vehicle is obtainable.

174

Regarding the ratios or different speeds brought about by the use of the philoss. Assume that the gear A is moved into engagement with the low speed plution. The latter will impart motion to the movable gear and as the latter is larger, the low speed philon must make a certain proportionate number of revolutions to rotate the main shaft plulon. With the second speed plution in mesh it is obvious that the speed of the main shaft is accelerated, and so on an to the direct drive. ates, these being actuated by the forks on either side of the inside segment member. The gear shifting lever is hinged at the bottom so that it may be oscillated from side to side, first engaging he inside fork, which has two positions, then being shifted through a slot and enzaging the outside forked member. The inside fork operates the reverse and low speed, the outside the intermediate and high. The shaft which operates the birk and intermediate members relesopes in the hollow shaft to which the low and reverse operating finger is attached. The forked member enzaging the side of the control member nearer the operator is attached to the hollow controlling shaft. An interlocking mechanism, the function of which is

An interlocking, mechanism, the function of which is to prevent throwing into engagement two different combinations at the same time, is depicted at Pig. 67. The device also holds disengated gears in such a position that they cannot be shaken into engagement and prevents the meshing of gears when the clutch is engaged. In other words, the interlocking device requires that the energy of the motor be interrupted by means of the clutch before it is possible to bring sear tech into mesh.

Referring again to Fig. 67, it will be noted that the brake drum is equipped with a ratchet and pawl arrangement. This is located just back of the transmission case and

is utilized when the vehicle is stopped on an upgrade. This service brake drum rotates at propeiler shaft speed, or about eight times that of the rear wheels. The device is fitted with a positive interlocking mechanism which prevents the pawl from being thrown into engagement with the ratchet when the reverse gear is in mesh, or the use of the reverse member when the pawl is thrown into contact with the ratchet. By the use of the device it is claimed that a loaded vehicle may be held on any grade brakes, and that the ma-

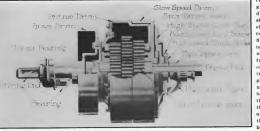


Fig. 49-Outlining Conventional Type of Planetary Transmission Mording Two Speeds Forward without the application of

The neutral effect is brought about when none of the speed pinions is in engagement with the shifting gear members. Flader these conditions the clutch may be in and the layshaft will be revolving because of the motion imparted by the constant mesh gear.

Changes of speed are secured through the means of a lever, this being depicted at Fig. 67. The member in this instance is at the right of the operator although its location may be at the centre or left, depending unon the design of the ear. The gear shifting lever has its movement restricted by what is known as a selective quadrant; that is, a metal frame so slotted that the lever may be pushed forward or backward in either of the two parallel channels. If the lever be moved forward in one of the channels, it brings one set of gears into mesh. If operated in the opposite direction in the same channel, it releases those gears already in mesh and sildes a different set into engagement. In like manner all the various combinations are secured.

The mechanism controlling the changing or shifting of the gears, is by two rods parallel with the gearshaft, each of these having a shifting yoke attached thereto engasins in a groove on the shifting member hub. Each rod is enulpped with a l'shaped member in which a lever oper-

chine may be restarted without the simultaneous releasing of the brakes and letting in of the clutch.

(To Be Continued.)

Ed. Note—The next installment will consider the prokressive type of transmission and other forms, including those in which the Kears are in constant mesh.

DEMAGNETIZATION OF MAGNETS.

The demagnetization of the magnets of a magneto is not generally understood. Although this seldom occurs the members may become demagnetized and when such is the case it mentally is due to improper wiring. It is caused by passing the current of a battery through the magneto windings. Some makers of magnetos utilize the colored wire cable scheme to facilitate the installation of the wiring and to prevent mistakes, it being only necessary to connect each colored wire to a terminal of corresponding color. This plan is adopted by the Remy Electric Company, Anderson, Ind.

Ing and by Google

SPECIAL BODY FOR ICE CREAM DELIVERY.

BYSATISE of the perishiable nature of the product, the motor track makes a particular appeal to those engaged in the delivery of lee cream. The possibilities for increased appeal are such that the packages may be delivered with much less danker of loss, effecting an economy in addition to the ability to carry larger loads and make a creater number of trips in a given time than with horse-drawn equipment. However, as with many other lines of business, it is desirable to consider the body problem with special reference to the work the vehicle will be called upon to do.

It is obvious that If one of the elements of economy in this utilization of the mechanical transport is its ability to carry a larger load, some provision must be made for securing the most advantageous use of the agace available. As is well known, the cream is packed for shipment in tubs and palls and it is somewhat impossible for those to be carried on top of each other. It follows that the floor of the truck must be utilized to its fullest extent, if the maximum carrying ability of the vehicle is to be realized

Accompanying Illustrations present the solution offered by the Sullivan Motor Car Company, Rochester, N. Y., maker of Sullivan trucks. This machine was constructed for a Rochester fee cream dealer and was displayed during the recent automobile show in that city. The body was finished in while, lettered and striped in gold, and the runsing gear was red. Its attractive appearance was a matter of much comment during the establishing, and a number of orders for duplicates of the construction were secured.

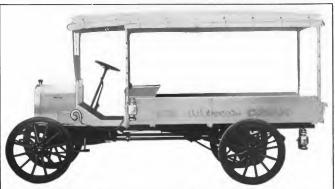
The smaller view gives a splendid idea of the interior as seen from the rear. This indicates particularly the method of providing for the utmost practical use of the floor space. It will be noted that the driver's seat is designed to occupy but half of the space in the front of the vehicle, and the openings on either side are available for storing packages of varying size.

This body has a width of 46 Inches, Inside, and that

portion back of the seat is seven feet six fuches in length. One-balf of the body has a carrying space of nine feet nine inches, and this additional two feet and three inches is of decided value in the fee cream business. It may be



laterior of Sallivan Ice Cream Wagon as Viewed from the Rear, added that the top is supplied with hinges so that it may be entirely removed, the stakes being designed to fold up with the rop. While constructed specially for the ice cream dealer mentioned, among the orders taken at the show three were for plumbers and another for a rug and capter concern.



SOLVING THE PROBLEM OF THE GAS TURBINE.

What Is Expected of the New Internal Combustion Engine—Some of the Difficulties Which Must Be Overcome—Progress Made and Suggestions as to the Possibilities.

MORE power, less weight, elimination of noise and reduction in complications are among the objects sought in the development of gasoline engines for the propulsion of automobilies and serial craft. With some engineers there is the suggestion that the present types in service have reached the limits of their possibilities in these respects. Leaving aside the merits of that position, it will prove of interest to consider some of the methods advanced for the solution of the problem in another manner.

For many years the gas turbine has presented a fascinating study in this connection, and while the progress has been rather less noticeable in America than abroad, it is worthy of mention that some degree of success has been attained. And it is especially in the features above enumerated in which the inventors expect superiority from the gas turbine. The difficulties to be overcome do not appear to be insurmountable; in fact, there already are constructors who claim to have solved, the problem.

Principles of Construction.

In order to appreciate the progress in the development

tion. However, it is considered improbable that success will be achieved along these lines. In the first place, it will be found difficult, if not impossible, to construct a pumping system qualified to act against such pressure and beat. In addition the mixture of party burned and fresh gasoline and air hardly will be expected to burn properly. Then again, there is an ever increasing heat, which by continued use will result in spreading or warping surfaces which must be kept smooth and tight.

A More Successful Type.

The second principle is illustrated theoretically at Fig. 11, and this appears to offer better possibilities of success. In this, f represents the turbine wheel, which is connected with a rotary pump g. The explosion chamber is outlined at b, and this is designed to explode the mixture at rapid intervals. The position of the valves, through which the burning gases pass to the turbine wheel, is shown at i, and k is the spark plug by means of which the charge is exploded. The double valve at i regulates the admission of fruel and air the gas conduit m fitting into that of the air n.

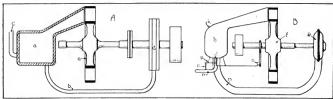


Fig. 1—Theoretical Sketch, Showing Principles of Gas Turbiness A, Simplest Form, or Continuous Burning Type; B, Consecu-

of the gas turbine, it is necessary to understand at least in a general way, the principles underlying its construction and operation, as well as some of the difficulties confronting the engineers now engaged in working out the proposition. The chief distinction between the gas and steam turbine lies in the fact that the first generates its own power within itself, while the latter is deependent upon a steam boiler for the power which it uses. For this reason, the gas turbine sometimes is termed a power generator.

The experiments made thus far may generally be classed under two somewhat distinct branches of design. One of these types represents the principle of a continuous braring of the gas and air mixture within a closed chamber, by means of which the gases are expanded and forced to and through the turbine wheel. This mixture is introduced to the chamber by means of a pump driven by the shaft of the turbine wheel.

Simplest Form of Gas Turbine,

A theoretical illustration of this type is shown in Fig. 1A. In this, the chamber a, in which the mixture is burned by means of a continuous series of electric sparks, is protected from heat losses by a heavy ashestos covering. The fuel is pumped into this chamber through conduits b and c by means of a pump d, which is driven by the shaft of the turbline wheel is.

This is the simplest form of gas turbine, and the principles described have been the subject of much experimenta-

The construction of this double vaive is such that the gas member is situated within the air member. The former is operated by a connection with a cam o, driven by the turbine, while the air vaive is worked automatically by the pressure of the exploded mixture, and by means of the lever p and the apring r, which act to hold it open.

The operation of this type of gas turbine is as follows: By turning the turbine wheel by hand a number of times. air is forced through the explosion chamber, vaives and flanges of the turbine wheel. After a sufficient number of turns, the gas valve will be opened and gasoline will be drawn into the chamber h, forming the explosive mixture. Immediately after the gas valve is closed, the spark plug ignites this mixture, which expands and closes the air valve. The exploded gas then passes to and through the turbine wheel, causing it to rotate. The air valve remains closed until the pressure of the expanded gas has left the cylinder. at which time it opens again and a new charge of fresh air and gasoline is taken in. This new charge not only has the advantage of driving the rest of the oid one into the wheel. hut it also has the effect of cooling the chamber and valves. which otherwise would become too hot for continued ser vice.

Multiple Explosion Chambers.

An engine of this type can be operated when the power of the explosions gives a greater turning pressure to the axie of the turbine than is taken up by friction, pump re-

and by Google

sistance, etc. In order, bowever, to obtain a working power surplus it becomes necessary to operate the engine at a much greater speed than is possible with only one explosion chamber. Therefore, a number of chambers is used, sometimes as high as 10. The more chambers employed, the greater surplus of power and the steadier will be this power. It may be pointed out that perhaps the most important feature of any turbine is that the source of power shall be as constant as possible.

There is one difficulty which presents useff with the use of ramy explosion chambers, and that is with reference to the intense heat engendered, especially when these chambers are within the wheel. It is possible to overcome this by using a water circulation cooling system, in which event the turbine flauged wheel has water chambers. By this plan, much of the water is soon turned to steam, and though the steam is sufficient to cool the surfaces of the flanges, the the heat is so great that it is found necessary to employ a large cooler, capable of condensing the steam generated. For this reason, the water circulating plan generally is not satisfactory.

Valve Difficulties.

There also are other difficulties which confront the constructors of this type of gas turhine. Because of the rapid valve action necessary immediately after the explosion, it has been found that only the automatic inlet valve can be used, and even this is difficult to construct in such

This device is operated in the following manner: Between the value spindle s and the cam in is assembled a aliding member e with a cam shaped lower surface. This siding member is operated as shown in the drawing, by the regulator r, which is in turn driven by the turbine shaft. The backward and forward movement of the member e regulates the size of opening for the valve f, as can be seen in the drawing.

The proportions of the cam surface on the member e represent the different openings of the valve. That portion of this cam to come between the spindle s and the cam nat the highest speed of the motor, and therefore at the greatest opening of the valve, is represented by the dotted line s.h. From h to er represents an overment of the member e when the speed of the turbine has exceeded the normal, in which case the valve opening would be reduced or entirely closed. The curve from b to d represents the different valve openings for empty running and for normal revolutions.

Hansen's Gas Turbine.

A further interesting experiment of Engineer liansen is illustrated by the drawings at Fig. 2B and C, showing a single drum form of explosion chamber within the turbine wheel. As can be seen at C, the air intervalve x and the lately are located within the turbine axie centre. The gasoline is reduced to a spray by being pumped through small openings into the explosion chamber w. The charge is regulated by means of a cam driven by the shaft of the

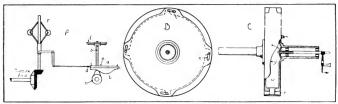


Fig. 3—Theoretical Drawing of Gas Turbine Components: A, Regulator for Controlling Gas Charget B, End View of Resulting Explosion Chamber: C, Section Through Same,

manner as to yield satisfactory results. The conditions of the automatic inlet valve are much different here than in the gasoline motor of the piston reciprocating type, since in that case it is closed by the compression stroke of the piston. In the turbine this compression does not exist, and the valve must be closed entirely by the pressure of the explosion, and it has been found that they generally are too heavy and complicated in design to be able to close with a speed equal to that of the exploded gas. The result is that the exploded gas passes back through the valve, either igniting the incoming charge or destroying its firing qualities by mixing with it. The difficulty of firing the charge after the valves have closed, and in using a mechanically operated valve, lies in that as the firing mixture has practically a continuous flow, only halted by the explosions, the closing of the valve would allow the gas time to escape into the wheel before the explosion could burn it

Regulation of Charge,

Another problem is the proper regulation of the gas and air miture with reference to the different speeds of the engine. Some success has been noted in the use of regulators which control the Intake gas vaite to the extent of causing it to open wider as the speed of the turbine increases. A device of this nature, which has been used by Priedrich Hansen, Hamburg, Germany, is shown herewith by theoretical drawing at Pig. 2. A.

turbine. After a number of trials, the automatic air vaive was sejected in preference to the mechanically driven member. The exploded gas passes out through eight conduits, designated by z in II and C.

Under test this turbline is said to base reached a speed of approximately 2500 revolutions a minute with 30 explosions a second. It is stated, however, that the successive rapidity of the explosions appeared to be of a somewhat similar nature to that of a constant burning of the charge. When the turble had been in operation 30 minutes the porta were red hot, and after an bour's continuous running this heat color bad spread on the outside of the casing to a circle near the axie. The heat at this point seemed to have reached its maximum and the color spread no further.

The weight of the turbine wheel was 6.5 kilograms (about 99 pounds), and it turned on ball bearings of the normal type. The feel used is said to have been 2780 grams (about a gallon) of kerosene and gasoline an hour Kerosene could not be used at first, but only after the engine had been running a sufficient length of time to generate the heat necessary to vaporifie it.

Pounds Pressure 1thtained.

A plotted curve of the pounds pressure obtained by the exploded gas at the different speeds of the successive explosions a second showed between 70 and 80 at one explosion and about 10 for 24. This rapid reduction in the pressure

of the exploded gas by the increasing number of explosions a second in held to be due to the fact that the speed had the effect of reducing the richness of the charge corresponding.

J. With a later model of somewhat similar design, Mr. Hansen reports better results. In this instance the power pressure developed was about 70 at six explosions a second and approximately 55 at 18.

Based on the experience obtained by the trials with these models, Mr. Hansen has constructed a new motor, that shown at Fig. 3, with which it is claimed that such that shown at Fig. 3, with which it is claimed that such practical results have been obtained the inventor feels justified in saying that he will soon be able to offer to the industry a tested, practical gas turbine for automobile and a valation use, well qualified to do the work and to enter the field of competition with present gasoline signines.

This turbine is made up of three cylinders, assembled in such manner, however, that they constitute one revolving explosion chamber. The air intake is arranged for in a similar manner to that described in the previous figure; that is, through the sale of the turbine wheel. The gasoline or kerosene enters through the centre of the air valve, and and is forced into the explosion chamber through a spray valve by the pump ast Fig. 3.

The explosion operates in reaction valve reversing cham-

Thus it will be seen that the industry apparently soon will have the opportunity of testing the practical gas urbine, and it may be added that it is to be hoped the results will justify the expectations of many who heliver that in this type of motor the ideal power plant is to be realized. Of corract it will depend upon how far it is possible to overcome present difficulties of construction in the engine itself, and when these are overcome the question of efficiency with regard to the consumption of fuel will be another important point for consideration.

Considering Power Transmission.

It also may be pointed out that a matter of some importance will be the problem of transmitting the energy, inasmuch as the possibility of constructing, a/gas turbine of light weight and high power undoubtedly will depend largely upon its high speed ability. It hardly would be practical to employ any of the present types of gear transmission with a very high speed engine in automobile work.

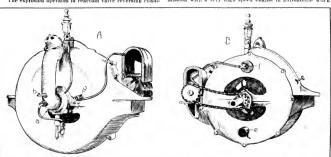


Fig. 3-Inlet and Exhanst Sides of Gas Tarbine Constructed by Friedrich Hansen of Hamburg, Germany, and Given Practical

bers, passing through the flanged wheel to the open air through the exhaust tube e, seen at the bottom of the casing in B. The spark plug f is used for firing any gas which may escape in the casing of the flanged wheel when the turbline is heing started. Spark plags constitutes the point of friction contact which conveys the firing current to the friction points of the spark plugs, fixed to the explosion chambers, as they revolve with these chambers past the plug g.

Method of Cooling.

The rapid revolutions of the chambers, assisted by the ventilator, which also revolves with the main axis, generate a forceful air current which has proved sufficient to keep the power plant cool and in good working condition. The cooling air, which has a pressure of a 24-mm 4.94-inch) water column at a turbies speed of 120 revolutions a minute, is exhausted from the tube b. For the purpose of allowing this cooling air to circulate through the parts, the axis is bollow and connected with the explosion chambers at three points only.

At first, the air which was heated by its circulation through the turbine, was used for the fuel mixture as well, It has been suggested that perhaps this difficulty could be overcome by utilizing electric or oil hydraulies. Electricity would appear to have particular qualifications, as the high speed of the turbine would make it possible to do the work with a comparatively small dynamo of light weight, which in automobiles might be attached directly to the turbine under the hood. This with the storage batteries for reserve, light and beat, and two electric diving motors in the wheels would comprise the entire power plant and transmission mechasism. Or, one electric motor located just behind the dynamo under the front platform extension and connected with the present design of live axis and differential might be used instead of two motors with

For heavy trucks a combination of a practical gas turbine with the oil hydraulic transmission would appear to offer special advantages. With this system, as with the electric transmission of power, the speed of the car does not depend upon that of the engine. In other words, the speed of the power generator may be kept constant, while an even regular graduation of the increase or decrease in speed of the velocities possible.

The Red by Google

AMERICA'S FIRST INDUSTRIAL POWER WAGON.

Novel Power Plant Designed by L. F. N. Baldwin to Drive Furniture Van for Department Store at Order of John Shepard, Jr., of Providence.

WHAT is believed to be the first industrial power wagon constructed in America was until to order for John Shepard, Jr., executive of the Shepard Company, which conducts a department store at Providence, R. I., by the Crulekhank Engine Company of that city, in 1896-7; to dealigns by L. F. N. Baidwin, the noted racing driver. This vehicle was delivered to the Shepard Company in the late spring of 1897 and was driven about for a considerable period, chiefly for exhibition. The machine was experimental and it was a distinct advance, but because of the defective earburetion and the inability to always secure proper traction with the steel tired wheels, it was not continued in service.

This was not the first power wagon owned by this company. In the winter of 1855-6 Mr. Shepard, who was enthused with the performances of some of the earlier experiments with motor vehicles, had a steam power plant installed in a two-horse express wagon. This machine was used for about three months with some success. It was not a practical construction, however, the power practically wrecking the wheels, so Mr. Shepard decided to have a wagon built that would be the better adapted for the service.

Mr. Haldwin was at that time superintendent for the Cruickshank company. This concern was noted for the quality of steam engines it built and it was naturally to an an expert that Mr. Shepard took his proposition. Mr. Baidwin designed and superintended the building and installation of the steam plant. He drove the steam wagon for a considerable period and, with his experience, was the logical man for the development of the real industrial transport.

Mr. Shepard wanted the wagon for business purposes and he believed that steam did not offer greater possibilities than did gasotlite. He wanted to have his wagon driven by an a gasoline motor and proposed that Mr. Baldwin build I. Mr. Baldwin is and an abundance of steam experience and Mr. Baldwin is and an abundance of steam experience and work. Accordingly he undertook the job. The work was a skilled mechanic whose speciality was experimentally work. Accordingly he undertook the job. The work was extended over a considerable period because of experiment and Mr. Isidwin designed an engine and transmission, invented or adapted an ignition asystem, and turned out a wagon that in general appearance compares favorably with those of fords:

It was accepted by Mr. Shepard that wagon construction was no experiment, but he wanted a power plant, and it was toward the development of this agent for propulsion that his endeavors were chiefly directed. The wagon was intended for furthier delivery and the order for the body was given a western body builder. The running gear of the wagon was ordered nearer home, this helps to specifications calling for heavier axies, springs, wheels, and other components.

The most important subject with Mr. Baldwin was the motor. It was necessary to install the power plant and all the mechanism below the floor of the body and to insure clearance a horizontal children was imperative. A compact plant and minimum weight were essential factors. To incorporate these Mr. Baldwin decided to build a two-yilinder four-cycle double-impulse motor that would produce about 25 horsepower. This motor was novel in every sense and was found to be efficient despite the poor carburvetion.

The cylinders were designed with liberal water-cooling space, there being about a .375-inch inner wall, an inch

water apace and a 2.5-inch outer wall. The cylinder was about 10.5 inches in diameter for nise inches of the length with a bore of 8.5 inches and then the cylinder was contracted to a diameter of 7.5 inches with a bore of 8.6 inches and then the cylinder was contracted to a diameter of 5.5 inches with a bore of five liches. The walls were not contracted at right angles but at an angle of 75 degrees with the walls. The cylinder head was cast integral and this was coned with the lines of the cone rising at an angle of 15 degrees with reference to the cylinder diameter. The angle of the cone coincided with the angle in the cylinder walls.

This gave a construction that, with the cylinder fitting both bores closely, had in the concentric or larger combustion chamber reactly the same area as the smaller or upper combustion chamber, and the coned walls and head were followed by the walls of the platon, this affording a strength that permitted a saving of about 40 per cent, in weight of



America's First Industrial Power Wagon, with Novel Power Plant, Ballt by L. P. N. Baldwin to Order of John Shepard, Jr., and Fitted with a Street Car Fender,

metal. The angularity of the piston heads was not such as to cause loss of power by a diversion of the direct expansive force. This entailed the placing of the writing in the extreme top of the piston and an extremely long piston rod was used, for the length of stroke for each section of the piston was six linches.

The construction necessitated two admission and two exhaust values for each cylinder, the admission values being so placed that they were between the cylinders when the motor was set up, and the exhaust values were on the outer sides. The values were mechanically operated by pushrods actuated by a camebalt driven by the crankshaft with conventional haff time gears, but the admission values were unique in that they each contained a carbureting device. The inclution was by hot tube, this being regarded as more dependable than any other method the vogue. The admission values were boiled to bosses on the sides of the admission values were boiled to bosses on the sides of the cylinders and to three the gasoline was piped from the tank. There was a float chamber with a float and a needical value to regulate the flow of kerosene and front this sat value to regulate the flow of kerosene and front this sat value to regulate the flow of kerosene and front this sat value to regulate the flow of kerosene and front this sat value to regulate the flow of kerosene and front this sat value to regulate the flow of kerosene and front this sat value through a spray norzei into a mixing chamber.

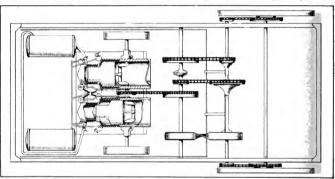
whence the fuel was drawn into the cylinder. While it was possible to regulate the fuel the air intake was fixed and could not be changed, which is a sufficient reason to account for the indifferent carburgation.

The ignition tubes were heated by two primus burners supplied with gasoline from a two-gailon tank hy air pressure feed, this being sufficient to last a full day. The tubes were so installed that the pairs for each upper and lower combustion chamber were heated by a single hurner.

The motor and the auxiliaries were enclosed in an tron box holted to the floor of the body. Extending back from the centre of the crankbafat a chain was run. There was a fighwest at either end of the crankbafat, one wheel being aboven in the accompanying illustration. The chain from the crankbafat drove a sprocket wheel on a second shaft drove a sprocket wheel on a second shaft drove a sprocket wheel on a second shaft drove a sprocket wheel or contained the differential. On this shaft was carried at the tergits side of the sprocket a pulley six inches in width. At the right side were two sprockets of differing size. Obstitution with the engine in motion this shaft was continuously driven by the chain running on the centre procket.

reverse with reference to a constant engine speed, and a variance of all three by varying the engine revolutions. From the jackshaft, drive chains extended to sprockets bottled no to the rear wheels. The chains were 1.25-inch pitch, of the type then used for farming machinery, and these were faulty in that they lacked strength and were frequently broken, presultating delay for repair. The control of the wagnow as by a wheel at the top of an upright shaft mounted in from of the driver's seat and by a worm measurements with a 5th wheel on the forewards.

As will be evident from the description of the carbureting admission valves the supply of fuel was warriable, but the flow of air was constant and the fuel feed was regulated from the driver's set by a lever. At one side of the engine case was carried a fuel tank with about 25 galions capacity, and at the other side was the water tank of 20 galions capacity, this serving to radiate the heat. The water tank was of large size, for there was no radiation other than by convection from this tank. No other method for cooling was provided. The floor of the hody was removable shove the engine to give access for regals or adjustment.



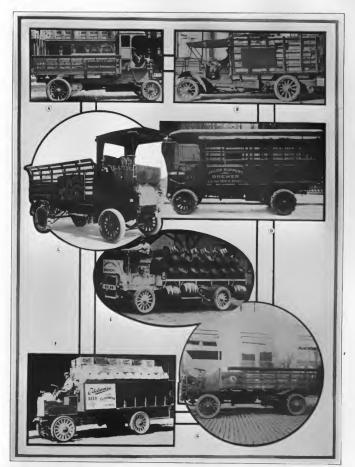
Skeich Giving Approximation of the Two-Cylinder Double-Impulse Motor Power Plant and the Transmission Employed in the Haldwin-Presigned Faralitare Van Huilt for John Shepard, Jr., at Providence in 1896-7.

The two sprockets at the right side of the shaft carried chains which were extended to the jackshaft. This jackshaft was much the same as are all shafts of this type in cars of today, having sprockets for the final drive chains at either end. But it differed in that it carried three standard Brown & Sharpe friction pulleys. Two of these at the right side carried sprockets lined with the two sprockets on the first or layshaft, the sprockets being so arranged that the smailer on the first shaft drove the larger on the tackshaft, this being the low speed, and the other two. with reversed proportions, giving the high speed. The sixinch pulley at the left side of the shaft was driven in reverse by a six-inch crossed helt. The friction pulleys were ail driven loose on the jackshaft until a speed was desired. when either the low speed or the reverse pulley clutch was engaged by one lever situated at the driver's seat, or the high speed ciutch by another lever, and the pulley became fixed and the jackshaft was driven until the ciutch was disengaged.

It will he seen that this gave high and low speed and

The engline was designed to give about 25 horse-power, and at times this power was realized, but at other times it and at times this power was realized, but at other times it was very much lower, much depending upon the carbu-urantee to the pressure in the combustion chambers was (sown the from the fact that hot tube ignition was used and this was also a factor in power. The accompanying illustration is shows the wagon equipped with a fender, this equipment of the Providence Car Fender Company, and who desired do the Providence Car Fender Company, and who desired to exploit this device as well as to afford a protection against a calcident. This was, so far as is known, the first, and perham the only, machine ever little with such fenders.

The speed of the wagon was normally about 10 miles an hour, but it was possible to vary the speed by changing the sprockets. The wheels were fitted with steel tires and with these on gradients when the roudway was wet, or on wet paving, it was impossible to obtain traction. The engine had power enough to spite wheels indefinitely, but the wagon was not heavy enough to give anchorage for lultial propulsion, though the weight was fully 3000 pounds. The



weight of the power plant was approximately 1300 pounds with the tanks filled. The body capacity was large, the wagon being designed to carry 20 complete bedsteads, with the head and footboards placed across the load space instead of lengthwise.

After the wagon bad been used for several months and its limitations had been established, largely from the character of tires and the carburction, and not from any other mechanical fault, it was laid up and later diamantied, the body now being in existence. While the design was crude and wholly experimental many of the ideas incorporated in It have been demonstrated to have practical value.

of incomparison with the first power wagon, it will prove of incerest to note the progress made in the construction and application of the industrial transport. To those who have followed the situation in the industry, there may be interested in the industry, there may be the recognition of the immense possibilities for service in this type of vehicle, as demonstrated by Mr. Shepard in this determination to accure if possible a satisfactory mechanical conveyance, which has done much to overcome some of the prejudices which have made themselves mani-

There still remains much of that adherence to custom or bablt, continuing what is known to be limited to every builaness principle and to every policy, because of unwillingness to take the initiative or to follow the lead of another. But there are certain lines in which endeavor has been made to meet the new conditions, and where there have been many delrous of following the example which brought shout the production of this first commercial motor vehicle.

There are few classes of service in which there is stronger demand for unfailing efficiency than in brewey delivery. In this field, the loads are heavy, the heules short, much of the travel is on paving, and the deterioration is proportionate to the use. It is recognized that the cost of delivery bears a different relation between the motor truck and the animal convergence than in some other lines of business. Service, efficient and regular, is the chief aim, although economy is to be considered.

It follows that the motor vehicles which have been used with success in brewery delivery represent at least one of the most satisfactory examples of the best standard practise in modern counteriols. The accompanying illustrations show trucks which have seen more or less service in this field in all parts of the country, some in large cities and others in smaller towns. They will furnish ample means of bringing foreiby to mind the splendid progress that has been brought about since Mr. Baidwin's initial attempt to produce an industrial power wagon.

MANY TIRES EXPORTED.

That American made thes are galning in popularity throughout the world is shown by the large increase in exports during the pair part. Thes to the value of \$117,210 were exported during the paint paint of the animal that is \$1910 amounted to \$150,214. The \$22,517,27. A comparison with \$1910 is not possible as previous to July of that year the government did not list three separately. The United States Tire Company, New York City, is now sending large consignments monthly to South Arrier. The company will take steps to still further increase its foreign business during \$1912, establishing branches wherever practical.



COMING EVENTS.

March.

March 2-9 -Pleasure car show, Boston, Mass.

March 2-9 - Show, Norfolk, Va. March 4-8 - Reliability run, Houston, Tex.

March 4-8 - Reliability run, Houston,

March 4-9 — Show, Des Moines, 1a. March 4-9 — Show, Reading, Penn.

March 6-9 -Show, Tiffin, O. March 6-9 -Show, Louisville, Ky.

March 11-16-Show, Cedar Rapids, Ia. March 12-16-Show, Denver, Col.

March 13-20-Commercial car show, Boston, Mass.

March 16-23—Show, Syracuse, N. Y. March 25-30—Show, Indianapolis, Ind.

Anett

April 27—Speedway meet, Los Angeles, Cal. April 27—Roadability run, Philadelphia, Penn.

May 4-Road races, Bakersfield, Cal.

May 15-17—Commercial car run, Chicago, Ill. May 30—500-mile race, Indianapolis, Ind.

May 30 - Track events, Salem, N. H.

June 20-Algonquin hill climb, Chicago, 111.

July.

July 4-Track events, Petershurg, Ind.
July 4-5-Track events, Taylor, Tex.

July 4-6-Beach meet, Old Orchard, Me. July 15-Reliability run, Wisconsin.

August.

Aug. 8-10-Beach races, Galveston, Tex. Aug. 23-24-Road races, Elgin, Ill.

September.

Sept. 2—Speedway meet, Indianapolis, 1nd.

October.

Oct. 5-Fairmount Park race, Philadelphia, Penn. Oct. 7-11-Reliability run, Chicago, Ill.

FACTORS IN TIRE EFFICIENCY.

The Motz Tire & Rubber Company, Akron, O., maker of Motz solid and cushion tires, is issuing an interesting book-let entitled, "Multiplying Truck Efficiency." The contents deals with the various tire problems in a practical manner and the pertinent facts are illustrated by half-tone photographs. The commercial and pleasure vehicle types are incorporated.

'VARSITY MEN AND TIRE MAKING.

It is interesting to note the large number of collegegraduates employed in connection with the automobile ridustry. According to W. D. Shilis, manager of salesmen of the Goodyear Tire & Rubber Company, Akron, O., many of the leading colleges are represented in the experimental and other departments of the company. Goodyear university men could, it is stated, form a football eleven that would include names very well known on the gridfron.

ELIMINATING DEAD MILEAGE BY TELEPHONE.

ELIMINATION of dead mileage is a proposition which interests taxleab companies throughout the entire country. While other items undoubtedly enter into the



Pittshorg Taxicab Driver Calling Up Central Disputching Sintina from Sabarban Telephone,

problem of making the takkah business a paying venture in American cities, some method must be adopted to minimize the number of return trips without fares if the maximum profit is to result. Various plans have been tried in a number of localities, but the satisfactory solution appears difficult to find.

It will be remembered that something over a year ago two or three of the larger taxleah companies in New York 'City combined forces in an effort to reduce the dead mileare. In this case, dispatching stations were maintained in what is termed the autowa and downtown sections of the city, and when one of the cabs in the downtown section, for example, delivered a fare in the uptown section the

driver reported to the nearest uptown stantion, to which he was attached until occasion might call for his being dispatched to the downtown section again. Under this plan it was necessary to readjust the number of cabs in the respective sections from time to time. The plan was expected to minimize the dead mileace in an appreciable degree, and a later announcement seemed to indicate that such had been the case.

However, many conditions enter into the subject in New York City and while some of these apply as well in other centres, some do not. The situation with respect to dead milessee varies materially in different cities. The topography of the city is an important factor, and the relation of the business to the resident districts quite as much so. More-cover, the situation varies during certain

hours of the day, a majority of the traffic being in one direction at one period and entirely the opposite at another, for instance Even this condition does not apply to all cities alike. In some centres there is a decided demand for taxicabs during the afternoon and evening and very little if any in the morning. In at least one city a plan was adopted in which a reduction of 33.3 per cent, was granted for taxicab service during the forenoon. It may be stated at once that the scheme proved a decided failure, and with reason.

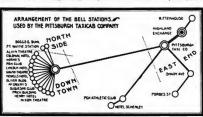
It costs money to operate taxicabs. If the operation of the vehicle on dead mileage represents a loss, operation at less than cost also represents a loss, and it is possible to have dead mileage even when cut rates are offered, in which case there is a double loss. In addition, it is difficult to make the public understand why it should cost more for a ride in the afternoon than in the morning. As a matter of fact it should not and no taxicab company can afford to operate cars at one time for less money than at another. Obviously some other method must be found for the elimination of dead mileage, since this scheme by no means takes care of the original problem, but creates a new one quite as difficult to solve as the first.

A specific attempt to eliminate dead mileage may be cited in the case of the Pittsburg Taxicab Company, Pittsburg, Penn, which has asked the Bell Telephone Company of that city to assist it in the matter. The scheme has been tried out for the past three months in an experimental way, and has proven so satisfactory that it is to be extended throughout the city.

The Pittsburg Takicab Company has been organized about 2.5 years, and its experience has been such as to indicate that the average cost of hasilage by takicab in that city is 31 cents a mile. It follows that every mile of dead mileage means 31 cents on the wrong side of the ledger. However, the topography of Pittsburg is such that long money-losing trips practically are eliminate.

An accompanying diagram sets forth this situation. Pittshurg may be described as three towns in one, east end, downtown and north side. Most of the hauls are confined to each locality, and 21 dispatching stations are maintained as indicated by the map. The central station of the company is in the east end. One of the dispatching stations is at Rittenbouse, one at the Pittsburg Athletic Club, another at the Hotel Scheeley, and the remainder in the down town and north side sections.

The east end, being the residential section, no difficulty in dispatching is experienced. Calls naturally are sent to



resident districts quite as much so. More- Diagram Indicating Location of Dispatching and Telephone Stations of Pittaover, the situation varies during certain barg Taxlesh Company.

the company's office and garage, which is utilized as the centre of this section, but it was in this part of the city that the largest number of long hauls without passengers COOSIC

occurred. The company decided that the difficulty arose from inability to signal cabs in this residential section.

The telephone company was called lato conference, with the result that a Western Union police telephone was placed on a pole at 8hady and Northumberland avenues, and another at Murray and Forbes stress. These interessections are quite a distance from the garage and Ritten-house stations, as will be noted on the map. Each driven was given a key and instructed to make stops at these tele-phone stations immediately after depositing his fare. If his services were needed in the immediate neighborhood hic was dispatched accordingly.

As has been stated, the new system has been in opera-

tion for three mouths, and the results from these two boxes indicates the mercicability of installing others throughout the entire city. When the plan is fully worked out it will be possible to have the driver stop at each box on his way hack to the nearest dispatching station, and the dispatcher at the private central telephone station of the company will be able to direct him to any fare which may have called in the interim. Manager John W. Webbley of the Pittsburg Tatich Company anticipates that it will be possible to handle at least 25 more calls during the busy hours under this plan with the same equipment, and that the drad mileage will be reduced to a minimum. Other cities will watch the further experiment with decided interest.

ALCO CREATES NON-STOP RECORD

What is claimed to be a world's non-stop truck record was established recently by an Alco 3.5-ton truck, made by the American Locomotive Company of New York City. The machine, which is shown in the accompanying illustration, was in constant service for 238 hours without stopping the

SAYS HORSE WILL NOT BE EXTINCT.

"If every automobile factory in the United States were to double its present capacity, and every machine was a commercial vehicle there would not be enough to take care of the increase alone in our commerce at the present rate of growth, if the government statistics can be taken as a guide,"

says W. E. Wright, the president and general manager of the Knox Automobile Company, Springfield, Mass. "The year book of the Department of Agriculture shows a wonderful increase in horse stock, In 1900 there were 15,000,000 horses in the United States and 10 years later, or in 1910, there were 24,000,000 showing a gain of 60 per cent.

"Horse have also intreased in value in 1900 the estimated value of animals utilized on farms was \$44 a head, with a steady rise, interrupted only by the panic of 1907. These values increased steadily, util in 1910 the average price was \$108, representing a gain of nearly 160 per cent. The value of horses and mules in this country 10 years ago was about \$815,000,000, while today it exceed \$3,000,000,000. This evidently does not bear out the assertions made frequently that in services and the services when the services were serviced with the services when the services was serviced with the services when the services was serviced with the services when the services was serviced with the services was serviced with the services was serviced with the services when the services was serviced with the se



Alco 3.5-Ton Truck Which Participated in a Non-Stop Service for the Adams Express Company of Philadelphia.—The Motor Was Ran Continuously During the Test,

motor. Originally it was intended to operate the car but a week, but at the end of that time it was decided to continue to better the record of 168 hours established a year ago.

The machine had been in service over six weeks when it was started to aid the Adams Express Company in bandling its Christmas business. Tausually severe weather conditions were experienced but the power wagon adhered to the schedule despite the snow and i.e., and made night deliveries to the residential sections of a number of New Jersey (tites.

The car performed varied duties and transported on the average about 35,510 pounds of merchandise, travelled approximately 56 miles, made 14 trips and 52 stops daily. The record mileage for one day was 86 and the largest number of stops made in one day was 104. During the two weeks the automobile covered 922 miles, made 198 trips and 1284 stops, and hauled 441,136 pounds. An average of one gallon of gasonize to an order of service was maintained. It replaced five two-horse teams and four men accomplished the work assigned to 19 under the horse draws equipment.

10 years the horse will be extinct, nor does it signify that the manufacture of automobiles is being overdone.

"At the present rate of increase in our commerce, in 1920 it would take nearly 6,000,000 borset to supply the demand. If the horse is to be superseded by trucks or tractors it would take, allowing that one truck will do the work of six horses, 7,000,000 machines, the life of these being estimated at five years. It would require a production of 1,400,000 trucks a year to supersede the horse entirely in 10 years."

FISHBACK COMPANY SEEKS LOCATION.

The Pishhack Motor Company, Newark, N. J., which was incorporated recently for \$1,900,000, is seeking a factory site, according to a communication received by business men in Youngstown, O., and other places. It is stated that the company proposes to market a line of low priced cars and wagons, and that it will require about six acres of land to accommodate its immediate needs.

The Red by Google

MOTOR TRUCKS IN SHORT HAUL DELIVERY.

Knox Machines in the Service of the City Coal Company, Hartford, Conn., Show a Decided Economy When Contrasted with Animal Carts in Actual Use, Both in Haulage and in Labor, as Well as in Time.

ity William W. Scott.

THE cost of any form of transportation is dependent upon the ratio of the total mileage for which revenue is received, provided, of course, that the market price for service is not below what will yield a fair margin of profit. it must be assumed, however, that any haulage enterprise must be reasonably profitable to continue. Many elements enter into expense. These factors are so numerous that it is doubtful that they are ever all recognized, and it may be that even a casual examination will reveal large possibilities for economy. But as practically every husiness is

the conditions are as nearly at parity as can be conjectured or desired

An experience that dates from May 6, 1911, with the service of the City Coal Company, Hartford, Conn., in which two Knox trucks are utilized with animal wagons and carts, is decidedly interesting in that it demonstrates there is practical economy in the short haul delivery made, a class of haulage that has always been assumed to minimize the advantage of the larger capacity and increased mobility of the motor truck. The first truck was of four



hans Pive-Ton Truck Londed with Lime and Coment and its trew of Driver and Two Helpers.

conducted with some regard to system it may be accepted that the methods employed are reasonably satisfactory.

Regarded purely as a commercial proposition every husiness man is willing and generally auxious to economize, vet there are many who nesitate to adopt what may appear to them to be experiment. It is needless to say that this apprehenaion as to results is inherent and many, until there is ahundant demonstration, are not willing to employ what has been unquestionably productive with others. The reason for this may be realization that there are no two concerns with methods exactly alike, and yet it may be failure to understand the possibilities.

That in transportation there has been neglect of the exactness of accounting applied to other enterprises no one will deny. The absence of the information that such data would afford is perhaps one of the greatest obstacles encountered by those who study the utility of the power wagon, for generally its service must be contrasted with that of animal transports. It is only when the two classes of havinge are employed that it is possible to make comparison that is valuable, for then it must be evident that

tons capacity, the second, received Sept, 1, was a five-ton machine

Delivers From Top of Hill,

As no intelligent conception of the work accomplished can be realized without knowledge of the conditions in which the company transacts its business, it is necessary to state facts which relate to the delivery service in which the trucks are engaged. Hartford is on the west bank of the Connecticut river and on an eminence that slopes in every direction, but more pronouncedly toward the river. The yard of the City Coal Company is in Garden street, very close to the highest point in the city, and the coal is delivered at the yard by train. This coal is in turn sent out to customers. As the loaded carts are sent down hill and the return trips are without loads when the haulage would be hardest it is possible to send out more equal loads throughout the year than would be practical were the conditions reversed. As a mater of fact the company has an advantage in the site of its yard that is worth a great deal of money in the course of a year, and each year this is becoming more valuable.

To emphasize this it should be stated that the average load of coal carried during the two severe winter months. and the three summer months when the temperature is excessive is from 65 to 85 per cent, of the weight haujed under more favorable conditions, as shown by the experience of similar concerns in other parts of the country. Hauling the loads down grade means quicker delivery, longer service for the horses, and generally increase of weight carried. The influence of these factors upon the general proposition is apparent, and it should be understood that this condition is decidedly advantageous to animal baulage.

Seths Coal and Building Material.

The business of the company, however, is not confined to coal, for it deals in lime, cement, brick and similar building material, which is distributed under the conditions stated with the same advantages. While the coal delivery

and does include the cost of food, shoeing and the Saturday pay roll. These items are to be supplied in completing the record for the year. With the trucks the five records maintained are insurance, labor, supplies, repairs, sundries, which are to be supplemented at the expiration of the year with the items of investment, interest on investment and depreciation.

Conditions Governing the Business.

For these reasons it is not possible to complie in tabuiar form what will effectually contrast the work accomplished by the two divisions of the service, nor is it possible to establish the exact cost. But it is entirely practical to make comparisons of the average haulage by the trucks with the maximum possibilities of the animal wagons, which does not by any means indicate the superiority of the former with respect to every detail-

Continuing the consideration of the company's business and its methods it may be stated that practically all the com-



Kney Five-Ton Truck Returning from the Delivery of a Load of Coni Carried in the Bags Shows on the Clatform.

is apparent that there is no limitation to the other division of the concern save the facilities for haulage.

The company has maintained a horse equipment that might be regarded as considerably less than the minimum requirements, aupplementing this with hired horses and carts as occasion demanded. While this minimized the cost for equipment investment it somewhat increased the expense when animals and wagons were hired because of the profit naturally expected by the owners renting them. In its accounting the company did not, until the purchase of the trucks, make provision to ascertain precisely the cost of animal delivery, and while it has more carefully systematized its records the data has not been computed and arranged so that exact details may be stated. There are other elements that have not been as yet determined. For instance, the record of the horse delivery does not include the cost of investment, interest on the investment, insurance, depreciation, restoration, repair or maintenance,

modities it distributes are received by rail and stored at the yard. In connection with the yard is the stable where 14 horses are kept and these are used for hauling four single and five double-team carts. As to the investment these represent it should be stated that it is estimated that \$1000 will purchase a pair of horses, cart, harness and other equipment, all first class. A single horse, wagon, harness, etc., will represent about \$600. No provision is made for reserve of horses other than to hire what extra animals and carts and drivers are needed, the price for a double team. cart and man being \$5 a day and for a single horse, wagon and man, \$3.50 to \$3.75. It will be seen that there is a profit made on these prices, but allowing \$1 a day for the horses, 50 cents for the wagons and \$2 for the man, the items are not excessive. It is estimated, however, that \$1 a day an animal will provide for the stabling, feeding, shoeing and veterinary attention and other necessary expenses in connection with the maintenance of horse equipment.

Horse Equipment and Its Work,

The City Coal Company, in systematizing its distribution, loads coal either in bags or loose in chute wagons. The time is usually in barrels and the cement in barrels or sacks. The proportion of the coal delivered by the clinte wagons is not large because of the fact that a comparatively small number of residences are arranged for chute delivery. Coal sent to shops and factories, however, is often by clinte wagons. The mileage of the chute wagon, which usually carries full loads, is estimated at 14.7 miles daily. The bag wagons average 17.1 miles daily. This gives weekly mileage of 88.2 and 102.6, respectively. The wagons are sent out with four loads each day, there being one long haul and one short haul each baif-day, this being found the better manner of economizing time. Allowing 24 loads a week for each class of wagon it will be seen that the average round-trip mileage for the chute wagon is 3,675. send a load of lime or evenent to a point five miles disiant meant a half-day at least, increasing the delivery cost and lessening the profit. To go nine or 10 miles meant a full day, or nearly so, for a team, cart and two men, and not more than three tons could be hauled. As the market expanded there was increased difficulty of delivery and greater cost.

in considering hanlage, taking the standards of a capacity load, a given distance and a stated time for a work the following elements of economy are found:

Capacity toad	Given Distance	tes Tim
Capacity Load	Longer Instance	Stated Tim
Larger Load	Given Distance	Stated Time
Larger Lond	Hiven Distance	Less Time
Larger Load	Longer Distance	Stated Tim-
Larger Lend	Langer Distance	Less Time

Any one of these factors would be a reason for making such change as would economize expense, and when two or



Koox Four-Ton Truck with Wood Body Adapted for Coal Delivery, It Being Fitted with Benr Chute for Quick Discharge,

and for the bag wagon 4.275. To expedite delivery and anset time a driver and a helper is always sent with either slighte wagon or team cart and sometimes a driver and two helpers with the larger loads. The maximum load for the sincle wagon is 3000 pounds and for the team cart 6000 pounds, which figures are rather less than the average loads in other localities, even where the load hualage is heavy. This statement indicates the conditions under which the business of the company was developed.

Turn to Trucks as Economy.

The experience during the summer and automn of 1910 and the winter of 1910-11 and the expansion of the business were such that the company found it necessary to consider additional delivery facilities. The results of horse haulage were not adequate because the custom for building material was increasing and delivery was of requently onside the city that the conditions were at times diametrically different when compared with the coal delivery. To

all three could be combined without possibility of failure of results or loss it would appear there could be no doubt as to the decision of a progressive business man.

Model R Knox and his Service.

Having had experience with pleasure automobiles and with a practical knowledge of these machines the members of the company decided to purchase a four-ton Knot truck. This was the Model R-16 with wheelbase of 12 miles as hour, and fitted with a body holst and a wood body with end gate discharge and chuie. A driver employed by the company was sent to Springfield, Mass., to the Knox factory, where he was fully instructed as to driving and carling for the machine. When the truck was delivered he drove it to flartford and since that time it has been in his care. It was hes leved best to have a fully competent and trustworthy driver and the result has justified the decision.

The truck was placed in service May 6, and to noon coople

February 22 it had been driven 6402.8 miles, as shown by the odometer, and had averaged 156.1 miles weekly during that period. This is about 26 miles daily, or 11.3 miles more than the average mileage for the animal-drawn chute wagon. Considering mileage only it has been driven approximately 75 per cent, further daily than the average horse team and cart, and has a load capacity of four tons as against three, or 33 per cent. more. The reason why this mileage is no greater is that the company started the truck at the same work the wagons are employed for, it being frequently sent out with a load of bag coal, for instance, to make four or five deliveries during a single trip. Of course with the driver and two helpers the distribution is quickly made.

Instances of Excess Work.

The long hauls were made by the truck and of course the greater number of these were with time and cement. it was utilized for emergency deliveries, which were frebut later the insurance was increased in amount and the registration cost was doubled by an amendment to the state law.

in keeping the expense of the truck under the general head of supplies were entered the items of labor, supplies (gasoline, oil, grease, waste, etc.), repairs and sundries. It was believed that the fixed charges could be learned with exactness at the end of the year, which would serve better than to estimate them. For this reason there is no manner of showing difference between estimated and actual items of expense, which would be a decidedly interesting result.

Second Truck Four Months Later.

After the truck was placed in service it was found so satisfactory that, with the expansion of the business through the additional facilities, it was believed necessary to make further improvement, and this impelled the order for the second truck, which was delivered Sept. 1.

With the receipt of the second machine the item of



City Cont Company's First Delivery Truck with the Body Elevated to Show the Chassis Equipment.

quent, because many contractors have their materials sent insurance was somewhat increased. It was also necessary to them daily, instead of storing a considerable quantity. The reason this plan is adopted is to prevent exposure of lime or cement in the absence of sheiter, for rain would cause decided loss. With haulage of this kind the truck could supply aufficient material to the builders that their work might not be delayed, this being a condition that attracted patronage, while with the coal delivery it had equal superlority as compared with animal carts. Without the truck prospective orders outside of the city were sometimes refused because of the cost of delivery, but it was found that a radius of a dozen miles or more could be served with the truck quite as well as the patronage of the city could be met with the old service. The truck speed was governed to 12 miles an hour and care was taken to keep the loads as close to the capacity of the machine as possible. Two initial expenses were \$152.75 for insurance and \$7 for the registration and driver's license fees,

to license both trucks, and this cost \$19 and \$23 respectively for the four and five-ton vehicles. iteginning with Sept. I a new account was inaugurated in which the expenses for the machines were divided for the items of labor, repairs and sundries, and supplies (gasoline, etc.), combined for the two, although the purchases for each truck may be separated later.

While the greater part of the construction work may be assumed to be during the six months beginning May 1 of each year it is begun as early as April 1 and it is continued until nearly if not quite to the end of the year. The family supplies of coal are usually delivered during the late spring and summer, but the shop and mili deliveries are generally to contract and with quantities not greatly varying each week. The last mentioned class of custom and the small and emergency family orders are delivered throughout the winter. From this it will be seen that the building material trade is in least volume during the severmonths of winter, and that coal purchasing is not extremely heavy, although the long period of low temperatures since the beginning of the year has caused a heavier business for 1912 than is ordinarily expected.

Week's Work Under Good Conditions.

To Illustrate the work that each machine has accomplished the following records are given:

	Four-Tun Truck	. Oct. 2-7, tac	inelye.
Weight.		Coal.	Lime and Cemen
Pounds	Londe	l'ounds	l'ounds
36,400	5	13,800	22,600
49,588	7	8,088	41,508
24,500	3	22,900	2.000
72,290	9	72,290	
44.450	5 7	26.520	17.900
59,940	7	59,940	
-			-
287,450	36	283,450	K1.800
	Fite-Ton Truck,	Oct, 2-7, Inch	nelse.
Weight,		Cont.	Lime and Cemer
Pounds	Lond	15ounds	l'ounds
55,000	6	24,000	31.000
58,100	6	13,000	45.100
44.710	5	22.010	22,700
51,000	5	51.000	
40,360	4	20,000	20.300
55,500	- 6	24,000	31,500
	= = = = = = = = = = = = = = = = = = = =		
384,610	32	154,010	150,600

Analyzing these results the following is found:

Four-Ton Truck, Oct. 2-7.	
Trips or loads	3
Daily mileage	
Round 4rlp average mileage.	
Average load, pounds	798

This is work equal to 48 full loads of 6000 pounds each with a two-horse toam and eart, or the work for 12 full days of auch equipment, making four trips daily. The three men on the truck were employed the equivalent of 18 full days, and two men on one cart for 12 days would equal 24 days for one man. Thus the truck did the work of two horse outfits and there was the asving of the pay of one man for six days.

		Five-Ton Truck, Oct. 2-7.		
Trips	43.0	londs		3
Daily	m	Heage		
Round	1 11	ip average mileage		
Avern	st e-	load, pounds	915	31.

This is work equal to 51 full loads of 6000 pounds each with a two-borse team and carr, or the work for 12.75 days for such equipment, making four trips daily. The three men on the truck were employed the equivalent of 18 full days, and the two men on a cart for 12.75 days would equal 25.5 days, for one man. The truck in six days did the work two horses would require 12.75 days to perform and the labor was 18 days' work for one man for the truck, equal to 25.5 days with the animal delivers.

Weight.	Four-Tun		10, 11, 12, 13, 15, Lime and Cement.	
Pounds	Londs		Pounds	Millenge
70,930	96	74,536		28.1
60.090	1	60,020		24.3
65,710	8	62,110	-1,690	23 4
46,710	6	16,710		21.2
50,780	- 6	50,710		25 1
49,710	6	33,710	16,000	21.0
313,930	41	324,330	19,600	143.1
			17, IN, ID, 20, 22,	
Weight,			Lime and Cement,	
Permande	Lemda	Pounde	Paunda	Millenson

			17, 14, 19, 20, 22,	
Weight,		Coal.	Lime and Cement,	
Pounds	Londs	Paunds	Pounds	Milienge
42,660	ă.	34,008	8,000	26 B
58,750	6	54,000	4,760	24.8
33,200	.5	33,290		26.2
37,500	5	37,500		22.4
41,600	S	25,008	16,600	28.7
39,858	. 5	10,100	29,758	22 7
		-	-	
252,900	31	193,880	59,100	150.5

Making similar analysis the following is found:

Trips o	r londs			41
lintly	mlleage			25.5
Average	e load, pour	nds		 5395 S

This is work equal to 58 full loads of 6000 pounds each with a two-horse team and cart, or the work for 11.5 days, for such equipment, making four trips daily. The three men on the truck were employed the equivalent of 16 full days, and two men on the animal cart would be the equivalent of 22 days. The truck did the work of two and five twelfths horse outfits and there was the saving of the pay of one man for 11 days.

Five-Tun Truck, Japaners.	
Trips or loads	31
Daily mileage	25.15
Round trip average mileage.	4.54

This is work equal to 44 full loads of 8000 pounds each with a two-home team and cart, or the work for 11 days for such equipment, making four trips daily. The three men on the track were employed the equivalent of 18 full days and two men on the cart would be the equivalent of 22 days for one man. The truck did the work of one and five-sixths horse outsite and there was a saving of the pay of one man for four days.

Comparison of Combined Work.

Combining the work of the trucks for the two periods instanced gives the following:

October period: Work equal to 99 full loads of 6000 pounds each with a two-horse team and carr, or the work for 24.75 days for such equipment, making four trips daily. The men on the trucks were employed the equivalent of 38 full working days. Were the horse carta used the labor would have been equivalent to 45.5 full days for a man. The trucks dit the work of two and one-eighth horse ourths each and there was a saving of one man for 13.5 days. January period. Work equal to 102 full loads of 6000

jounds each with a two-horse team and carr, or the work for 25.5 days for such equipment, making four trips daily. The men on the trucks were employed the equivalent of 36 working days for a single man. Were horses used the labor would have been equivalent to 51 full working days for a man. The trucks did the work of two and seven-twenty-fourths horse outfits each and there was a saving of one man's labor for 15 days.

Cost of Operating Motor Trucks.

Now as to the cost of the trucks. The liens of lievest-ment, interest, depreciation, linerance, have not been considered. The price of the four-ton Knox chassis is \$4000 and the five-ton chassis count \$4500. To these must be added the expense for the body equipment and the delivery. The insurance will saverage about \$1575 annually. The expected depreciation is 20 per cent. These will not vary greatly.

The actual cost for using the trucks has been as follows:

	Knet Four	Tun Truck.		
Inte	Labor	Supplies	Repairs	Sundries
May 6 to Sept	1 \$124.54	\$128.13	8 3 33	\$ 4.20
Sept. I to Feb	1 542 17	*113.57	15 24	**29 75
	\$976.71	\$241.70	\$14.15	\$31.95
	Kana Pive-	Ton Truck.		
Sept 1 to Feb.	1 \$697.41	*\$113.57	\$74.92	44482975

*Supplies expense equally divided between the trucks, ***119 for registration and driver's liceuse. ***121 for registration and driver's liceuse.

Taking up the analysis further it is found that the fourton truck was in service from May 6 to Feb. 22, when the mileage record was taken, 246 working days and for that time the daily average was 26.30, and a weekly average of 15.780, against an average of 10.26 miles weekly for a bag wagon and 88.2 for a chute wagon. The truck compares best with the chute wagon. For a period of 147 days the fiveton truck had an average mileage record of 21.22 and a weekly average of 127.32. Taking the cost of supplies for each truck for the entire period to Feb. 1 the cost was four cents a mile for the four-ton truck and 4.2 cents a mile for the five-ton truck.

The total cost of the four-ton truck for labor, supplies, repairs and amories, which included the registration and the driver's licenses, was \$1337.21 during the period specified, and this was an average of \$5.75 a day. The average for the flevion truck was \$6.76, but it will be noted that the charges for labor to the five-ton truck are considerably larger than for the older machine.

In the figures that bave been presented it must not be assumed that these were selected with a view of making the best showing that could be made. As a matter of fact the four-ton truck in one week in October ind a mileage of 138 miles and carried 23.149 pounds of freight. The January record is probably as good as any that might be noted, though it has been materially exceeded in mileage.

Relative to the five-ton truck: It has a record of 143.9 miles in a week in October, and carrying 313,510 pounds of freight, which exceeds the first period stated, and in a week in January with a milesque of 105.2 miles it delivered 3130,070 pounds of freight, or nearly 30 tons more than during the week specified. This will evidence that the quotations have been at least sufficiently economized to be regarded as conservative.

Capacity Loads for Animal Carts.

it will be noted that in every comparison made the work of the trucks has been placed against capacity loads for animal carts, and obviously it is not possible niways to send out a full load. Considering this fact it will be understood that the full value of the trucks does not appear on the face of the statements concerning them. There has been no instance where the trucks have not been, with the loads carried, at least the equal of two two-horse cart outifs, and the mileage record shows that they travelled a distance approximately 50 per cent. more. This fact is also important.

One of the great advantages of the trucks is in serving the increased erritory. To illustrate: There is one customer at Glastonbury, eight miles from the yard and with a good road the entire distance. A two-borse team will haul three tons to this customer and return to the yard in six hours, but this is practically a day's work for the animals and they can be used but little more, if may, the same day. The five-ton truck will take from five to six tons to the same customer and return in 2.5 hours.

Considering this service on the basis of bauling n ton eight miles, it may be shown as follows:

W	eight Carried	Miles	Time
Two-horse carl 6	sheupog 600.	8	6 hours
Five-ton truck	abnuoq 000,	8	2.5 hours
	al To		
Two-horse cart	shounds 000,	8	15 hours
			95 minute

in this it will be seen that the truck will carry one ton and deliver it in about 21 per cent. of the time required by the naimal cart, assiming the facts stated. With the load at 10,000 pounds the time is increased to 30 minutes for the ton or 25 per cent, of the time required by the horses. In this it will be understood that there is not only the saving of the time of the truck but of the three men who man it, a very material item in the expense of maintaining a delivery system. This quality is emphasized because it has been shown that under the losal favorable conditions the trucks are more than equal to two two-horse delivery outfits, while their superiority becomes more and more apparent as the baulage distance is increased.

The first truck is driven by the man who was instructed in its use at the Knox factory and the larger machine is handled by an experienced man who was hired to keep it in order and operative. The company has not yet attained the proportions that would seemingly justify it building a special garage and equipping it with facilities for specially maintaining its trucks, but it would seem that this would be a logical result, as it is probable that one or more trucks will be added this spring. The company has not been disappointed in the vehicles and the delivery has unpusestionably been improved.

in connection with this statement the subject of tires is decidedly interesting, but it is not possible to give figurea relative to this expense, despite the material mileage of each machine. According to the officials of the company the original shors are on the four-ton truck and these appear to be not more than half worn. The statement was made with the milesge at 60428. There has been no decided wear evidenced on the shors on the five-ton truck, which had at the same date been driven 31185 miles. Per-haps the tire experience has been unusual, but there is no question whatever that there has been a seemingly satisfactory service with a prospect of this continuing for a considerable period, at least.

AMEND MASSACHUSETTS BILL.

The opposition to the proposed Massachusetts bill to limit the weight and speed of commercial vehicles utilized in that state, apparently has had its effect upon the legislative committee as it practically has been agreed that the act shall be amended so that the weight limit shall be 12 tons instead of six. At the hearing, truck owners, dealers, etc., appeared in opposition to the measure. It was agreed to refer the bill to a sub-committee, the latter to meet a committee of truck users.

Regarding tires the protestants against the bill recommended an investigation by experts to obtain adequate data relative to the transportation of freight upon roads and bridges. Figures were submitted by an opponent of the measure, alleging the impractibility of equipping wagons with one inch of tire for each 800 pounds.

STEBBINS ASSIGNED TO NEW YORK

H. S. Stebblin of the General Motors Truck Company, Detroit, has been assigned to New York as Enatern district manager of the company. The rapidly increasing business in this territory has made this move necessary and Wr. Stebblins will have charge of all interests, both in the development and the administration of the business. He is well known to the industry, especially with respect to transportation, having been for years the rraffic manager of the leading rationods, and his experience in this as well as in the commercial car field eminently qualifies him for his new position. He has been traffic manager of the General Motors Truck Company for several years, which position he still retains in connection with his other dutles.

SPECIALIZES IN DUMPING WAGONS.

Announcement is made from Harrisburg, Penn., that ground has been broken for a new motor truck factory, in which J. D. Hipple and C. C. Bennett will be interested. It is understood that the product will be of the heavy duty type, and that the company will specialize in vehicles for bauling and dumping coal, and, building materisis, etc.

CARING FOR THE COMMERCIAL VEHICLE.

THE ACCOMPANYING communication takes up a sub-ject in which the owner of a commercial vehicle has a direct personal interest. The writer, Henry J. Barbour, has long been connected with the Avery Company, Peoria, III., which concern has been engaged in the manufacture of industrial transports and tractors for a number of years. The information contained therein is the result of a careful study of conditions which have been presented in the use of these vehicles in various sections of the country and covering a long period. Mr. Barbour therefore speaks with authority, and his consideration of the subject should prove of decided importance to the owner and operator of commercial motor vehicles.

Editor, MOTOR TRUCK.

Motor trucks have become recognized as being no longer in the experimental stage. Every day we hear of firms who in the experimental stage. Every day we hear of nfms who have discarded the old horse system and accepted the modern power wagen, both for light and heavy haulinge, and of suc-cess in some new field, in the country as well as in the cli-But seldom do we hear of the failure of the motor truck sys-But seldom de we hear or the course, and were as in the city, tem, and if we do we are almost certain to find some other cause than the vehicle lise! Most manufacturers take great pride in the construction of their product. They to put into chiner are built and assembled under the most careful supervision. Mon of ability and experience employed, and road. Therefore it must be seen that if a machine "falle down," when if gets into active service. It generally is " down" when it gets into active service, it generally is the fault of the man who is driving it.

fault of the man who is driving it.

Usually, the troubles of a minimum control in the machine, or careless and bad driving Labelcalion is the machine, or careless and bad driving Labelcalion is the machine, or careless and bad driving Labelcalion is the machine, or careless and the control in the control

Generally speaking, there are three kinds of all used on a tienerally speaking, there are three kinds of oll used on a motor truck. First, there is a comparatively light oil for the motor and hearings, second, a heavier or non-duld oil for the gears and wheels. If the latter he fitted with roller beaings, and lastly, a hard oil or grease for the transmission and differential.

Beginning with the engine, we find that inside this cylinder oil is used. It is best to use the oil for which the car was designed, or that recommended by the manufacturer. There are at least haif a dozen first class oils on the market, any one of which can be used without anxiety, but all cylinder oils

must have the following characteristics:
They must be non-carbonizing; that is, they must not deposit a layer of carbon in the combustion chumber

posit a layer of carbon in the combustion chumber. They must not become summy, They must be of the greatest body or viscosity possible, yet permit a uniform feed all them, regardless the properties of the prope

They must never contain any gritty foreign matter, which will furrow the bearings.

Cylinder oil with three summers are contained and the contained and the cylinder oil with the summer, always are that the cylinder oil is at the correct height in the crankesse. If there has a circulation pump in the crankesse, it must be in good working order, otherwise the engine is liable to overheat, the principle of the cylinder, and the result is a burned-out moist, which will have to be rebarded, to become

burned-out motor, which will have to be reburned, to become Not long and, we received a letter from a man who bought a truck, teiling us that be had had great misfortune with his entitle. It was his own fault, however. The man had driven small amount of oil. The result was that after going up several sands hills and traversing about three-quarters of the real sands with and traversing about three-quarters of the

eral sandy fills and traversing about three-quarters of the distance, he found the engine was overheaded and there was hardly any lubricant in the crankcase instead of stopping and sending ahead for oil he thought he could make the lown, and started is do so. Within about two miles of his destination, he heard an awful crash, and jumping off he found that one of the connecting rods had burned off the crankshaft and had been shoved through the crankoff the crankenatt and had been showed through the crank-case. The result was a heavy expenditure through his own condition if good work is expected of them. The next thing to be considered is the oiling of all the small gearling. roller hearings and compression cups. These should be oiled twice a month with a heavy or sent-field oil,

but not as hard as that used in the larger genting. Like all oils, this should be free from any grifty matter, and must be able to stick to the gears. On all wheels and the other bearings there will be found oil cups. These should be filled at bearings there will be found oil cups. These should be filled at the contraction of the cont

That a fremendous amount of cnergy is exerted in the heavier gears, such as the transmission and differential, is self-It has been proved that close to half a million footevident. evident. It has been proved that close to half a million foot-pounds are exerted on every tooth of the transmission gears it one minute, when the truck is travelling at a rate of approxi-mately 18 miles an hour. Think of it! A force on each little metal tooth, sufficient to raise 500,000 pounds one foot a

minute:

Since this is true, the care and the olling of the transmission and the differential can be seen to be very important. Without oil, the friction and heat would be terrible. Therefore, an oil of certain good qualifies must be used. It must cout the working parts at all times, and ashorb the friction. It must cling tenaciously to the gears, regardless of the heat or cold, yet at no time become gummy or resinous.

Another cause of failure in motor truck service, is that due bad or careless driving and the abuse attending this upon. the clutch, brake, chains and tires,

the clutch, brake, chains and lires, one to drive a track, braces are case individual rives a cor in a little different manner, and the various methods of shifting grars in the transacer, drive interaction consistency of the interaction of the constraint of the co

a burst of momentum from the car that nearly tears of a tire.

If the clutch be the habit of gripping, slipping or spinning, it should be attended to at once. Gripping is due to faulty mechanism, too light spring tension or lack of oil.

Slipping is not dangerous, but is the cause of much annoyance, and loss of time and power transmitted to the driving wheel. and loss of time and power transmitted to the driving wheel The causes either are insufficient spring tension or a greaty surface (if the clutch be leather faced.) in the first case, the spring can be tightened, but in the second, French classic should he used to get rid of the greate. Spinning clutches Spinning clutches. should be used to get rid of the grease. Spinning clutches are so called when the clutch driven shaft continues to revolve after the clutch is disengaged. It causes a series of blows on the teeth of the gears in the transmission, which is very destructive. Some manufacturers fit this member with a blows on the tecth of the gears in the transmission, which is very destructive. Some manufacturers fit this member with a clitich brake. The clutch is a most important part of the truck and it should be considered as such. It should be ex-amined and tested once or twice a month, and if it fall to doits duty should be adjusted immediately.

There is an old law in physics which reads something like There is an old law in physics which reads some-thing like the "A body in motion reads to stay in motion; a body at rest the "A body in motion reads to stay in motion, and it will do so whitele in motion tends to stay in motion, and it will do so whitele in motion tends to stay in motion, and it will do so will stopped by frieldor, where the frieldor of its parts or any other than the stay of the stay of the stay of the and those to be of any value must be effective and dependable. A large brake surface is aderiable. No thereton trusk of the stay of the stay of the stay of the stay of the like truck weighing 1000 pounds and running at the rate of 50 miles an hung verts about 16,000 footbooms of energy.

25 miles an hour exerts amout assess foot-pounds of energy, power must be absorbed by the brinat from 11 to 15 horse-power must be absorbed by the brinat surface be small; the menne heat, and therefore, if the brinke surface be small; the pressure a square finel is creater and the brakes are liable to pressure a square finel is creater and the brakes are liable to a square inch, and the less tendency to burn it also mixed a square inch, and the less tendency to burn it also mixed be said here, that the larger the brake surface the less that brake trouble.

Trucks generally are equipped with two kinds of brakes Trucks generally are equipped with two kinos of praces, the liternal expanding and the external contractine, and it has been as the condition. It has been a support of the kept in the best of condition. It has been a support of the car can be stupped at once, but when the brake is released the bands should not drag. Cotter pins in the brake rots abould also be inspected to see that none are lost or bruken. oil should not be unspected to see that none are ton; or orogen, if brake surfaces be leather, camel hair or some other belting, oil should not be used on them, but if the surfaces be metal against metal, they should be lubricated to prevent "furrowing,

Herakes should not be overworked or strained unnecessarily, about truck drivers go as fast as they can until they already and the strained and true. This is absolutely uncalled for A good, careful or a true. This is absolutely uncalled for A good, careful or a strained when gradually and the strained and the st Brakes should not be overworked or strained unnecessarily advancing the throttle.

assuming the involve.

Tire trouble is another thing that keeps the cost of a metor fruck up, but a heavy tire expense is often due to a poor or careless driver. A few given rules can be laid down for this:

Jon't allow oil to get on the tires or allow the truck to stand in a puddle of oil. Iten't start or stop the car with a Jerk. Don't round corners at a high rate of speed. Don't unnecessaril turn sharply. Pon't turn the steering wheel while the victoral Expense of the rear tires may sometimes be due to the fact that the radius reds are not adjusted an equal amount on each side of the truck, the rear axis is not at Tight angles to the driving chains and not parallel to the countershaft Wear on the driving chains will become evident if this be time. CERO This fault can easily be remedied by lightening or toosening the rods

More resulters are due to bad driving than to any other cause. It is front's economy to put a Baseweck boy on a Boson cause. The ford's economy to put a Baseweck boy on a Boson above the more cause and the second of the second as above. The more easily a motor truck is started the better it is form the lift of the case," In stopping it is the same. Slop only to the driver but to others in the street, for it is evitain only to the driver but to others in the street, for it is evitain More troubles are due to bad driving than to any to cause skidding

In changing gears, observe the following rules In changing gears, observe the following rilles Throughedown the engine. Diseignage the clutch entirely. Shift your gears easily. After the gears are shifted, engage the clutch stowy; and advance the throttle until the engine reaches its normal number of revolutions. When you come to a hill, change the higher speed to a lower one as soon as the truck begins to slow down. Dun't change speeds after you have stalled the motor, Alsa, don't change too soon, for that is almost as bad as too late.

Keep your truck as near its original efficiency as possible, and to do this you will have need to use good common sense, and plenty of good oil at all times,

Very truly yours,

HENRY J. BARBOUR

CONTEMPLATES BUILDING SERVICE STATION.

Editor, MOTOR TRUCK,

Penris III Feb 24

We will build this summer a suitable sales and service building for sutomobile business in this vicinity in charge of S. II buddow, formerly of Youse & Duddow, Reading, Penn. We are interested in garage building construction, machinery and tools, appliances, supplies and accessories for commercial and pleasure cars We would be pleased to receive literature on any of these lines Address all communication to S. H. Daddow, St. Clair, Yours truly.

St Clair, Penn., Feb. 28.

MINERS SUPPLY COMPANY

ANNUAL MOTOR TRUCK PARADE.

At a meeting of the Motor Truck Club held at the rooms of the Automobile Club of America, New York City, recently, plans were promulgated for the second annual parade of commercial vehicles which will be beld Saturday, April 13, It is expected that at least 500 power wagons will participale, as it is estimated that there is at least 50 per cent.

Saurer Truck Fitted with Conf Damping Body in Service with Olin J. Stephens, Inc., New York City.

more cars in service than a year ago when the first parade was held. The initial event was very successful, despite the inclemency of the weather, and the display did much to demonstrate the efficiency of the automobile for business purposes. The meeting was well attended, there being present a large number of members representing the leading makes of the country and a general committee was anpointed consisting of members of all standing committees. and special duties were assigned to the various branches of the committee organization. It is expected that sultable prizes will be provided in the several classes and special inducements will be offered in the way of prizes for loaded machines

TRUCK ECONOMY IN COAL INDUSTRY.

Among the many industries in which the motor propelled vehicle is replacing the borse drawn equipment is the coal business, and those concerns which have given the motor car a trial are discarding the animal and building up fleets of automobiles. The latter has many and distinct advantages over the slower means of transportation, and the most striking is the cost a ton-mile for delivery

Among the large coal dealers of New York City is Olin J. Stephens, Inc., whose yards are located on 138th street. This concern placed in service a 6.5-ton Saurer truck, made by the Saurer Motor Truck Company, Plainfield, N. J., and equipped with a Wright dumping body, which is shown in

the accompanying illustration Since this machine has been installed it has averaged from 30 to 50 miles a day, carrying a fiveton load

The dumping body is fitted to a stock chassis and rests upon substantial sills. It is raised to any desired height by a device which obtains its power from the driving shaft, and the mechanism is simple and controlled easily.

Leading from the body is a chute, through which the fuel passes, and it is claimed that a five-ton load of coal may be discharged in seven minutes. This arrangement permits of the car hauling and discharging 10 loads a day or 50 ions. The machine averages from nine to 10 mlies an hour and the gasoline consumption is rated at about one gailon to every Bye miles

Compared with the former horse drawn equipment there is large gain in favor of the motor car. A two-horse team hauling about three tons, required from 25 to 36 minutes to unload, and in addition it was impossible to chute the coal the same distance as with the machine.

The operator of the automobile is an employee of the company, who drove a team of horses for 16 years. His employer states that his truck cost them less for maintenance than any other, which was due to the excellent care taken of his outfit. He not only inspected the wagon for needed repairs but gave his animais careful attention and always remained at the barn to see that they were fed. watered and cared for properly.

The company believes that the driver of the horse drawn equipment who is considerate of his outfit, will give the same attention to the automobile, and that after becoming familiar with the machine will develop into a better operator than could otherwise be secured. Obviously, this plan makes for decided economy.

MANUFACTURERS ACT ON OVERLOADING TRUCKS.

ABOTT to representatives of prominent connectal mofor vehicle manufactures held a two-day convention in New York, March 4-5, at the headquarters of the National Association of Automobile Shanufacturers, i.e., in accordance with a call issued by the commercial vehicle committer of the association. The principal objects of the meeting were to promote better acquaintatace among the manufacturers, to discuss trade conditions and to recommend action by the national association looking toward greater uniformity in construction, ratings, warranty and selling methods. Personned niterest in all questions taken up for discussion was evident and the results of this first general meeting of the trade are most gratifying to the committee.

The following representatives were present: S. D. Waldon, Packard Motor Car Company, presiding; W. E. Metzger, Metzger Motor Car Company; Charles Clifton and H. Kerr Thomas, Pierce-Arrow Motor Car Company; Benjamin Briscoe and Alfred Reeves, United States Motor Company; B. A. Gramm, C. E. Stone and P. K. Dexter, Gramm Motor Truck Company; F. I. Harding, Peerless Motor Car Company; Vincent Link, Universal Motor Truck Company; G. J. Loomis, Speedwell Motor Car Company; Albert 1. Pope and W. C. Walker, Pope Manufacturing Company; A. M. Chase, Chase Motor Truck Company; E. O. Sutton, Knox Automobile Company; A. W. Robinson, Locomobile Company of America; A. J. Doty, Lansden Company; Will H. Brown, Mais Motor Truck Company; Walter C. White, White Company; 11. F. Flowers and William P. Kennedy, American Locomotive Company; Peter Dumont and George H. Kelly, Baker Motor Vehicle Company; H. S. Diller, Lauth-Juergens Motor Car Company; Murris Grabowsky, Alden Sampson Manufacturing Company; H. S. Stebbins, General Motors Truck Company; C. H. Wallerich, General Industrial & Manufacturing Company; Herbert G. Streat and F. P. Lewis, Knickerbocker Motor Truck Manufacturing Company; J. T. Langhorne, Packard Motor Car Company; E. W. Curtis, Jr., and F. Neison Carie, General Vehicle Company; David Reecroft; S. V. Norion, B. F. Goodrich Company; C. W. Fletcher, Waiter Motor Truck Company; G. A. Hodges, International Motor Company; David S. Ludlum, Autocar Company; H. E. Colfin and R. D. Chapin, Hudson Motor Car Company

After a short address of welcome by President W. E. Metzer of the N. A. A. M., and a brief talk on trade conditions to Col. Charles Clifton, the meeting was called to order by Mr. Waldon. Following discussions on the different topics, the meeting passed resolutions recommending adoptions by the National Association of Automobile Manufacturers of uniform maximum speed rations with load for motor trucks of different load capacities and uniform weight allowance for the simplest form of loady regularly extallogoed, as given in the accommands tables.

Table of Maximum Speeds and Londs.

- tiet	nie	Miles	Standard	Lood & Std Body	tal-flody Overload
Tons	Perumis	Hour	Herely	(pound <)	- specific lear
	1.000	16	500	1,5000	1,749
1	2.040	15	644	2,600	2,494009
1.5	3.000	1.6	700	3.740	1.300
2	4,0000	1.3	9110	1.500	5,600
2.5	5,000	12	51010	5,5000	6,989
	6.000	1.1	1 (1111)	7.040	% 24d
3.5	7,000	10.5	1199	4,100	9.500
4	5 000	18	1.2494	9, 200	100 5000
4.5	9.000	9.5	1390	10.299	12.100
5	10,000	9	1 100	11,140	13,100
-6	12,940	4	1600	13,609	16,000
7	14,000	7	1590	15.590	15 600
	16,000	6	2000	15.000	21 200
	13,000	5.5	2200	79 299	23 400
10	20,0110	8	2100	22,100	26,480

The question of a standard allowance for occasional overload was given much attention and it was resolved that "in the opinion of the meeting it is inadvisable to encourage the belief that a truck is designed to carry any weight in excess of its rated capacity, or to permit a warranty to apply to any truck which is overloaded." The meeting recommended the preparation of a standard plate for the chassis on which should be attamped the rared capacity of the machine and some such admonition as "Do not overload."

There was considerable discussion regarding the abuse of dementrations and the advisability of making charges by the day for these, the rate of charge to be based upon the capacity of the trucks. It was the consensus of opinion that such charges should be made, the anyments therefor to be refunded upon purchase of the machine. No scale of charges was decided upon.

The desirability of a standard form of warranty was generally agreed upon and after exhaustive discussion of the subject the following form was recommended to the executive committee of the N. A. A. M. for adoption:

STANDARD MOTOR TRUCK WARRANTS.

We warrant the new motor trucks manufactured by us for 30 days after the date of delivery in purchaser, this warranty being limited to the furnishing, to our factory, of such part or parts of the motor truck, as shall, under normal use and service, appear to us to be defective in material or workman-

skip.

This warranty is limited to the eliminate to the purchase we This warranty is limited to the eliminate to the purchase the limited to replace the port or parts which upon their return to us at our factors, for inspections, we shall have determined were defective, and provided the transpertation charges for the quite of the state of the purchase the state of the state of the purchase the state of th

We make no warranty whatever in respect to tree, rims, imition asparatus, lampe, are tables, situating devices, generature, or inher trade accessories havenuch as the same are The condition of this warranty is such that, if the mone truck to which it applies, is altered or repaired outside our factory or if it is impetched at a need in even of its factory expectly, then this warranty shall become until and void and our habitity under its shall become until and void and

The number of the motor truck to which this warranty shall apply is into the described as into the control of t

With the object of securing greater uniformity of dimensions in motor truck sheels and bands, it was resolved to recommend that the dimensional tulerance, of felloe bands recommended by a technical committee of the Society of Automobile Eugineers, after a careful investigation, be adopted by the N. A. N. These tolerances are given in a report of the S. A. E. technical committee for Pebruary, 1912, as follows:

t. Tolerance in circumference of fellow band shall be as follows.

entire width of total.

(This modifies our recommondation in separt accepted at
the June, 1911 meeting of the society to meet the requirements of the more extensive manufacture of rigid base three to
Telerance in which of fellies land.

Up to and including four inches 03125 03125 10625 to six inches 01632 0625 10 12 inches 01632 06625

2.—Variation in trueness of band when placed on surface plate. Band shall touch at all points within 2.125 inch up to and including six inches width. Over six inches width within

· Variation in thickness of band due inch plus or minus

5—Trueness to round. The radial tolerance on the wheel when felloe band is applied shall be .8625 inch plus or minus or This plus or minus olerance must not occur at diametrically opposite points. There shall be no flat spots or kinks in felloe band on the flighted wheel

Resolutions were also passed recommending that the commercial vehicle committee continue work in the direction of securing data on the width and length of chassis frames back of the seat with a view to possible future standardization of bodies for interchangeability on trucks of the same capacity; also toward securing data as to wheel diameters, helpid of frame or platform from the ground and corresponding heights of railroad cars and loading platforms.

In connection with discussion of the tire and maintenance questions following a very interesting paper on tires read by S. V. Horton, of the B. F. Goodrich Company, and a talk on maintenance guarantees by W. P. Kennedy, the meeting recommended that the committee obtain and classity information regarding tire mileage in cities having wideby different street conditions as concerns topography and character of paving.

Contracts and price reductions on quantity orders were touched upon as matters of interest to the trade, but no action was taken. Mr. Waldon made an interesting explanation of the Packard system of reductions on all orders for two to 50 trucks delivered within one year, and the information was developed that one or two other companies have adonted a similar contract plan.

During Tucaday's session a very informative and interesting talk was made by David Beecroft on delivery delays due to traffic congestion in streets and atleys in Chicaço and suggested co-operation of the manufacturers with commercial bodies, architects and other interests with a view to providing receiving departments in office buildings and otherwise effecting changes that would enable trucks to make quick deliveries and sect away.

The meeting adjourned to reconvene upon call on June 4 next, and on Nov. 7.

PITTSBURG ADOPTS MOTOR DELIVERY.

As in other leading cities automobiles are revolutionizing the delivery systems of the large department stores in Pittsburg, Penn. Horne's, McCreery's, Boggs & Bubl's, Kaufmann's and Rosenbaum's stores are delivering the greater part of their sales by automobiles, while other concerns are experimenting with the more progressive vehicle.

The largest fleet is maintained by the Joseph Horne Company which has utilized power wagons since 1902. A number of White machines, made by the White Company, Cleveland, O, are in service and these are mostly shoed with pneumatic tires. McCreery & Co. maintains six White cars of 1500 pounds capacity and Rosenbaum's store is equipped with vehicles of the same make. As a result of the the use of machines a large number of the stables have been reconstructed into garages and some of these are very complete. Regarding the service a member of one of the leading concerns stated that each vebicle replaced two borse drawn equipments.

SAYS ECONOMY IS CONCEDED.

According to Lin McKle, manager of the commercial vehicle department of the Botton branch of the Vello Motor Vehicles Company, Moline, Ill., it is no ionger a question of the economy of the truck over the horse drawn equipment. He bases his statements upon observations made at the shows where the question of economy was rarely asked by prospective purchasers. The average business man is convinced of the fact that the automobile is more economical.

WILL CO-OPERATE WITH DEALERS.

Announcement is made by the United States Tire Company, New York City, that in the future it will discontinue the sale of motor car tires direct to the consumer. Notices. bave been posted in each of the 26 hranches, located in the various cities, stating: "The voluntary retirement from the retail field has been under consideration by the officers of the company for some time. In finally declaring itself out of the retail business the company relinquishes a profitable trade, as all its branches bave done a big husiness in dealing direct with the consumer. However, it was argued that this husiness should rightfully go to dealers in towns where these hranches are located." In making the announcement to the trade the company states that it desires. to show in a substantial way it appreciates the decidedly friendly attitude dealers have manifested toward the company's lines.

PROPOSE MOTOR STAGE LINE.

An automobile stage line connecting Augusta and Rockland through Washington, Me, is probable, owing to a spirited contest between the towns of Washington and Jetereson to see which will obtain the new interurbin trollves road between Rockland and Augusta. For over 169 years a stage line operated by horsee has been maintained between Augusta and Washington and it always has done a large business. Of late the equipment has not been equal at to the traffic. When it was runored that the new trolley line would pass through Jefferson rather than Washington business men in the latter town opened negotiations for automobile service.

ANNUAL PRODUCTION OF RUBBER.

The annual production of rubber of all grades is eathmated at 75,000 tons, according to the United States ettr-Company, New York City. About 50 per cent. of this total is being used in the manufacture of motor car tires and accessories. About 40,000 tons comes from the valley of the Amazon. Rubber has become the largest individual item in point of value in the import trade of the United States, and a concern like the United States Tire Company utilizes thousands of tons each year.

ACETYLENE STARTING DEVICE.

The Imperial Brass Manufacturing Company, Chicago, maker of brass specialities has brought out two new specialities which were displayed at recent motor car shows. These consist of a gas regulating valve and accelerator pedal. The former is intended for use in regulating the pressure on acetysene systems, either for lighting or in connection with a self-starting attachment. The accelerator pedal consists of a segment of a circle rising just above the floorboard and may be operated with a forward, horizontal motion, during which movement the foot remains in a natural position.

FLANDERS DELIVERY TYPE POPULAR.

There is a growing tendency among retail merchants to adopt the uncer progressive form of transport, the automobile, which is not only decidedly efficient but economical. According to the Studebaker Corporation, Detroit, maker of the Flanders "20" light delivery vehicle, 1912 will witness a large increase in the use of these machines. This statement is based upon the results obtained at the recent New York shows where orders were taken for 1910 area during one day. The Flanders is fitted with a body specially designed by experts in the Studebaker waxon plant at South Bend.

ng zeday Google

RECENT MOTOR VEHICLE PATENTS



TANKE TATOM WITH MICHELL BUT AND A TONION ...

Acctylene Generator.

An acceptene generator which is a departure from the usual form is noted in the patient granted Joseph Corroper, Oakland, Cal. It consists of a removable water dome in which is mounted a turnuble valve regulating the dripping of the water to the carbide in the lower vessel. The gas generated is led through a spiral coll attacked to the exterior of the device to a bell shaped member which acts as a reservoir and thence to the lights by the usual double one-mines.

Throttle Mechanism.

A patent has been granted to Charles B. King, betroit, assignor of one-half to Ora J. Mulford of the same city, for a throttle mechanism which is operated both by lever and pedal, either independently of the other. It consists of a movable, adjustable sleeve attached to the steering post which is slotted. This is fitted with a lug and a pivted lever, to which the pedal is connected, engages with the sleeve. Another rod is led from the first lever to the throttle of the carburetor.

Spring Clauro.

A device adoptable for use as a repair clam for vehicle springs has been patented by Owen T. Hawkins, Pomona, Cal. It comprises a U shaped frame, and a member moving longitudinally in recesses of the legs of the frame, and a stationary part, the latter having permanent means for preventing longitudinal movement of the member when in normal position.

Anti-Skidding Attachment.

Charles H. Myers, Franklin, Mass., has patented an anti-skidding attachment, consisting of an oblique tread plate, having relatively diverging and transverse flanges upon the outer face, and inwardly extending finance at the lateral edges, there being solts through the plate, and side plates so arranged as to engage tread members through the slots. There is also a flexible tension device exerting pressure upon the plates in the direction of the centre of the wheel.

Resilient Wheel.

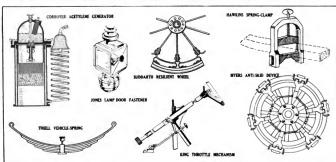
A resilient wheel which utilizes a cushion tire, has been parented by Johnson A. Suddarth, St. Joseph, Mo. One end of the spoke is attached to the hub and the other connected to springs, one side of which is permanently fastend to the tim of the wheel.

Vehicle Spring.

A vehicle spring, the construction of which permits of lubricating the bearing surfaces, has been invented by John S. Thiell, St. Louis, Mo., to whom letters patient have been granted. Each of the series of leaves is fitted with a zigzag groove in its upper face and the members are held together by a bolt having grooves in the opposite sides of the shank portion thereof. The grooves of the latter communicate with those of the leaves and lubricant is fed by means of a cup attached to the bolt.

Lamp Door Fastening.

A lamp door fastening device has been patented by William T, Jones, Detroit, assignor to the Edmund & Jones Manufacturing Company of that city. It comprises a pair of spring arms upon which are mounted spherical members attached to the side of the lamp. A globular member is fastened to the door of the lamp and when the door is closed the globular part is crowded between the spherical members, the latter holding the former securety.





VOL. III.

MARCH, 1912.

NO. 3.

AUTOMOBILE JOURNAL PUBLISHING COMPANY
Times Bidg., Pawtucket, R. I.
William H. Bluck, Treasurer. D. O. Black, Jr., Secretary.

Publishers of

THE AUTOMOBILE JOURNAL THE ACCESSORY AND GARAGE JOURNAL

'Phone Pawtucket 1000,

EDITORIAL DEPARTMENT:
CARL A. PRENCH.
WILLIAM W. SCOTT.

ADVERTISING DEPARTMENT:

W. R. Blodgett, 25 West 42nd Street, New York City.

Western States-

G. A. Eldredge, 304 San Building, Detroit, Mich. 'Phone Cherry 1953.

P. G. Lurinu, 1405 Ulifton Ave., Chleage, Ill.

PUBLISHED THE FIRST OF EACH MONTH.

SUBSCRIPTIONS

The United States and Mexico, the year, \$1 in advance; Canada and Foreign Countries in Postal Union, the year, \$2 in advance. Fifteen ceuts the copy.

ADVERTISING RATES:

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding. Anonymous communications not considered. Correspondence on tors, all motor driven farm, fire, and mustlepal apparatus, the motor industry and the trade, will receive attention. Riamys must be enclosed to insure return of unsolicited

enteriousions.

Entered as second class matter, February 25, 1911, at the Postoffice at Pawtuckel, R. L., under the Act of March 3rd, 1879.

LIMITING WEIGHT OF TRUCKS.

Manufacturers, owners and prospective purchasers of commercial automobiles cannot fail to be interested in the bill before the Massachusetts Legislature, seeking to limit the weight of vehicles using the highways to six tons. Concerning that portion of the act prohibiting a speed of more than eight miles an hour for cars carrying over four tons, few will be disposed to offer any objection. It would seem, however, that any attempt to restrict the loads carried is a step backward.

It has been pointed out in these columns that certain bridges in some sections of the country districts were not designed to sustain the weights applied to them by the modern methods of transportation. The bill appears to be an effort to transfer the responsibility for damage incurred to these, and incidentally to the truck, from the town to the shoulders of the vehicle owner. Obviously, this is contrary to the established usages. If highways and bridges are incapable of taking care of the increased burden placed upon them it would seem quite the proper thing to reconstruct them.

The importance of the proposed legislation cannot be over-estimated. Massachusetts has set an example for many other states in matters of motoring laws. If this bill is allowed upon the statute books it will mean a decidedly restricted market for cars of more than two or three tons capacity. There can be no good reason

for its passage. It does not seem possible that Massachusetts legislators will adopt this radical step, but the situation calls for immediate and effective action.

THE BOSTON SHOW

Now that the two so-called national motor truck shows have been held, clinic interest centres about the first evelusive commercial vehicle show of the Boston dealers. Inasunuch as the pleasure car display in that city always has been considered the largest, most complete and best business exhibition in the country, its not impossible to forecast the same situation with respect to the industrial transports.

As a matter of history, it may be stated that the first commercial cars jurchased and utilized in many of the important cities and towns through New England and the East were purchased at the Boston shows of other years. With an entire week devoted to the exploitation of these vehicles it is not at all unreasonable to assume that this end of the industry will receive a decided awakening in these six states. That the motor truck possesses qualities which fit into the economic problems of these manufacturing communities is well known. All that is needed is an opportunity to bring this home in a direct manner, such as will be afforded by the Boston display.

From the standpoint of the manufacturer or business man who bionestly desires to give this problem the best possible consideration, no better opportunity ever lass been afforded than that which will present itself in Mechanic's Building. Boston, during the week of March 13-20. One of the largest exhibits of power wagons ever prepared will wawt his inspection, and with every possibility to study the merits of the respective products side by side. It will be a remarkable assembly, of the industry's best representatives, and no business man who desires to keep well informed as to the modern methods of doing business can afford to miss seeing it.

ACCESSIBILITY OF THE POWER PLANT.

Those who have followed closely the new designs brought out during the present show season cannot fail to be impressed with the fact that the manufacturers are devoting a large proportion of their attention to the production of business vehicles which shall present the greatest possible accessibility to working parts. This applies particularly to the power plant, which may be regarded as the chief component of the

Efficiency of service is the one great aim of the successful truck design. The business man who adopts the nechanically propelled transport to the exclusion of this horse drawn equipment wants to be certain that the newer vehicle will give him at least equally reliable service. Mechanical parts will wear, just as horses will become incapacitated. Present day manufacturers have taken note of this and have arranged to replace the affected part as readily and with the loss of no more time than the replacement of the animal.

Other new features are incorporated into the 1912 designs, but it seems safe to assume that no one subject will attract more attention from the business men than this endeavor to provide for easy, simple and effective replacement and adjustment. In this one respect alone the models offered for the present season are a decided improvement over past design. But accessibility of the power plant is by no means the only progress that may be noted in a careful study of the new vehicles.

LOCOMOBILE FIVE-TON TRUCK.

Vehicle Designed for Heavy Service and Developed by Long and Careful Experimental Work, Embodying Many Qualities That Commend Themselves to Those Desiring Thoroughly Mechanical and Enduring Construction.

T HE advent of the five-ton Locomobile truck at the Madion Square Garden show was the occasion for unusual interest from the fact that it had become generally known that its distribution of a little state of the control of the versal years it had built a series of service vehicles that ranged from delivery wagons to ambiliances and from police patrols to chemical fire apparatus.

There was decided concern among those in the industry because the Locomobile Company of America, Bridgaror, Conn., is one of the oldest manufacturers of automobile vehicles in this country and it has consistently developed types regarded as typically American. Not since the first machine was marketed in July, 1839, has a car been antruck was decided as being approximately what would best serve the requirements of those engaged in heavy haulage and upon this foundation the design was created and developed. In developing this design every known condition was inquired into and this caused the establishment of factors of safety beyond any question and of construction that would endure under the attenues of hard and continuous industrial service. The purpose was to build a vehicle that would endure such usage at misimum cost and attention.

Truck Design Evidences Progression.

In the design decided progression is evident. This does not mean application of new principles, but the combining and harmonizing of what has been proven and will make for reliability. As an example of sound engineering prac-



Locomobile Five-Ton Track Chassis Without Body Equipment, With the Superstructure Covering Motor and Containing Driver's Sent Installed.

nonneed that was not justified in results obtained by the purchasers, and each successive gasoline model has been a development with reference to that which preceded it.

The policy of the company has been to standardize so far as this could be done. Radical changes have never been made. Each production has been distinctly a development in that it has been perfected in detail and carefully refined. The company has an admirably equipped plant and adequate facilities for experimental work and manufacturing, and in A. I. Riker, its chief engineer, has the services of one of the recognized experts of the industry. The Locomobile cars have been looked upon among the standards of the untoring world. They have been known for the care in designing, the quality of material, the character of workmapship and the excellence of finish, the machines harmonizing in appearance and in detail.

In the production of this track have been combined the results of the long experience of the engineers in designing the differing vehicles built and the data obtained in an exceedingly careful investigation of service wagons and the conditions of their use, this including mechanical practice and commercial methods and usage. The capacity of the the the truck is worthy the attention of every person intercetted in havings. Every detail has been worked out theroughly, and strength, safety, simplicity, accessibility and certainty of operation and control are factors impressed upon those who have examined the machines. Nothing designed for pleasure car construction is used in the truck, it is compactly built and yet has a body platform of large area. The naximum carrying capacity for the wheelbase is insured, the truck may be turned in a radius of 27.5 feet, the view of the driver is perfectly clear, and the operation of the nachine has been so simplified that the greatest endurance and reliability has been afforded.

One quality believed to be realized to an annual degree is balance or equalization, this not only with reference to the rotating or reciprocating parts but to the relation of to size to case of handling, of power to strength, to the balsize to be obtained by the size of the size of the size of the weight when loaded or miloaded. The dimensions of the chassis are as follows. Wheelbase, 149 Inches; forward to tread, 55 Inches; wist to be caps, 55.75 inches; platform with platform of the size of the platform of the size of the platform of the size of

control.



Head-Dn View of Locomobile Five-Ton Truck, Showing the Ventilated Forward Frame Member Protecting the Radiator, the Front Wheels and Asie, and the Superstructure.

height above ground when loaded, 29.5 inches; platform height above ground when loaded, 46 locked; divers seet heave ground when loaded, 47 lockes. When loaded properly the rear wheels ansatia about 70 per cent, of the weight, this being a result when a canacity freight be earried. When light the rear wheels carry about 55 per cent, of the truck's weight. This distribution is believed to be the best that can be incorporated in truck design from the viewpoint of securing sufficient tractive effort, minimizing load resistance, equaliting the wear and narring case of

Heavy Duty 45 Horsepower Motor.

The motor is a heavy duty type with four water-cooled eyilinders with bore of five inclies and stroke of six incluse, developing 45 horse-power at 900 revolutions a minute, which is the maximum speed intended for this engine. While it bears a resemblance to Locomobile automobile motors it differs materially as to proportions and means of installation. It is heavily built throughout, for this means endurance and efficiency.

The T type cylinders are cast in pairs from a fine quali-

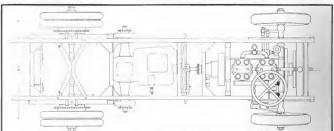
ty of grav iron and with the water jackets integral. The jacket spaces are ilberal to insure efficient cooling and the water outlet manifold is integral with each cylinder unit cap and extends longitudinally along the cap, the caps being respectively front and rear with reference to the form of the manifold. This construction eliminates the possibility of leaky joints as sometimes experienced with the separate manifold. These manifolds are connected between the cylinder units by a large hose section. The cylinder castings are bored, reamed and ground to finish. The pistons are of the same material and similarly turned and ground to size. The pistons are grooved for four rings installed above the wristpin. These rings are .25 Inch in width and after annealing to relieve them of all internal stress are carefully ground to an exact fit. The crankcase, as is the practise of the Locomobile company, is a bronze casting divided longitudinally, the upper section carrying the main and camshaft hearings. This construction incures absolute alignment of the main bearings and avoids any possibility of crystallization of the metal from the vibratory stresses from road shocks. The lower section of the crankcase forms a reservoir for the lubricant and when it has been removed the crankshaft, main bearings, camsbaft, camshaft bearings and the big ends of the connecting rods may be examined or worked upon

Five Main Engine Bearings.

The crankshaft is 2.5 inches in diameter and is mounted on the main bearings solidly anchored in the cross webs of the upper section of the crankease, the journals being secured by lock washer, plain nut, castellated locknut and cutter pin for each bearing. These crankshaft bearings have a projected bearing area of 41.34 square inches which reduces the pressure a square inch of projected bearing to a minimum. This large bearing area makes for a longer life for the bearings and lessened motor troubles.

Generous Water Circulating System.

The cooling system is absolutely positive. The radiator or is large and the water jackets and pipe connections so generous that eight gallons of water are required to fill them. The water is circulated slowly by a rotary pump located on the exhaust side of the crankease at a point midway between the cylinder units and driven by an outside shaft from the timing gear. The water is forced into the cylinders at a point at the base of the exhaust valve chankers, thence it is circulated through the water jackets and from the beads of the cylinder units. The water connections are not perfectly rigid and are not subjected to the stresses of intense heat or thresholds. The radiator is mounted in the chassis frame on large rubber buffers and is behind a heavy cross member for protection, this member being perforated.



Plan View of the Locomobile Pive-Ton Truck Chansis, Showing the Relations of the Different Components, 100 COOLC



Section of Channel of Locomobile Pive-Ton Track from the Middle of the Transmission Case Forward, Including the Clutch and Pawer Plant.

with large circular boles to prevent the reduction of the radiating draft through the radiator. Mounted on the front cylinder of the motor is a bracket in which is an eccentric case carrying two bail bearings, in which the shaft carrying the the large one-piece aluminum fan is installed. The fan is driven by a 1.75-inch flat belt from a pulsey on the crankshaft extension. By floosening a nut the eccentric may be turned and the fan belt adjusted.

Connecting Rods and Their Bushings.

The connecting rods are I section drop forgings and of sicel having such attength that the factor of astery is 25. The big end and wristpin bearings are very large and are proportioned to the main bearings. The big end bearings are carried in caps that are held by the same means as are the main bearings. The valve action is conventional, the valves being actuated by right and left cambatts driven by spiral gears from the crankshaft and the valves are large and afford certain inlet of fivel gas and the exhaust of the burned gases. The valve siem guides are cast separately rand forced into the cylinder units, this allowing replacements.

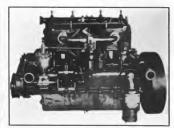
ment should they become word. The exhaust stanfold is in two parts, one telescoping within the other, this eliminating any stress between the cylinder units from longitudinal expansion, which might change the alignment of the written and crank oin bearings.

Standard Locomobile Design Carburetor,

The carburetor is the standard Locomobile design, being of the float feed type and is fitted with both hot water jacket and a hot air regulator. Only a single jet is used, lacket and a hot air regulator. Only a single jet through its design has the functions of both the single and multiple its design has the functions of both the single and multiple tits design has the functions of both the single and multiple per period of the single and multiple size of the size of th



Cohunt Side of the Locomobile Truck Motor, the Water Injet Being Around the Echnunt Volves and the Telescopic Exbount Pipe Connection,



Inlet Side of the Locomobile Truck Motor with tiovernor, Magneto, Carburetor and till Pump, and Shaving Heavy Supporting Tubes,





Upper Half of Locomobile Truck Maine Crankease, Displaying the Five Large Main Bearlogs, the Maoner of Retaining Them, the Crankshaft and the Thing Gears.

The speed of the motor is limited to 900 revolutions a minute by a specially designed ring governor located at the left side of the motor in front of the magneto. It is of the vertical ring type and is driven off the magneto drive shall by spiral gearing. The governor ring is mounted on the shaft at a normal inclination to the horizontal plane of 53 degrees and is supported by two cams. It is held normal by a spring, but as the speed of the motor is increased the resistance of the spring tension is overcome and the ring approaches a more nearly horizontal position. After the governor has been adjusted it is sealed that it cannot be changed. The governor prevents speed, which is far more dangerous than overloading, and it assures the owner that the vehicle is not abused. The ring governor was adopted because the ring could be machined to insure perfect balance, as an imperfectly halanced ring would cause vibrations at high speed that would impair the efficiency of the device. The governor is connected by linkage with a butterfly vaive in the carburetor which remains wide open at all speeds of the engine until 900 revolutions a minute have been attained. Then the governor operates and the valve is operated, and the supply of fuel controlled.

Unfailing Flow of Lubricant,

The system for inbricating the motor is decidedly efficient, it being self-contained and continuous in operation, combining both splash from the reservoir in the base of the crankcase and force feed from a gear-driven positive pump. This system has the advantage that it cannot be changed by the operator and it will supply a constant and unvarying flow of lubricant. There is no possibility for failure unless there be neglect to replenish the oil, which is a remote possibility.

Motor Rigidly Supported in Frame.

The motor assembly is firmly and rigidly supported at either end in the chassis frame in a manner that is simple,

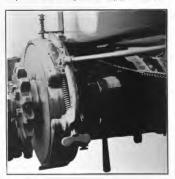


The lievernor of the Locomobile Five-Ton Truck Motor and the Dry Pinte Clutch of the Driving System,

insures ease in removal and makes certain that upon replacement the motor will be in positive alignment. At
either end of the crankease are heavy lugs through which
holes are bord. Two steel tubes, three leckes in diameter,
are passed through these holes, as may be noted from the
illustrations of the motor, and are chunged upon the tubes
by clamping boils. The ends of the tubes are seated in
east steel hearing brackets which are boiled into the chassis
frame affer the motor has been perfectly aligned, and are
retained in these bearing brackets by caps that are boiled
irmly. This installation eliminates all strains upon the
crankease and the motor assembly may easily be removed
from the chassis should this be necessary.

Dry Disc Clutch Makes Ease in Starting.

The Bywheel is exposed and this carries the self-contained dry disc clutch. This construction insures against the plates becoming misaligned. The connection with the transmission genere is by a driving shaft that has a universal action. This form of clutch has been adopted as being better adapted to withstand the heavy stresses of starting a load from rest than is a cone clutch. The clutch is commosed of seven driving discs that engage with six hard-commosed of seven driving discs that engage with six hard-



Right End of the Jockshoft of the Locomobile Five-Ton Teack, the Large Service Brake Drom and Band of the Forward Driving Sprocket.

ened and ground driving bolts attached to the clutch drum bolted to the flywheel. These dises are of .125-inch abeet as-et, carefully hardened and perfectly faced by grinding, as-et, carefully hardened and perfectly faced by grinding, the perfect of the same thickness and metal as the driving dises, but are faced at either side with a non-burning heat-resigning material .16 inch thick. The clutch is extremely powerful, is easily released because of the saml number of frictional surfaces, may be removed with comparative ease without dismantling other components, and requires practically no attention. The driven members have been made light to minimize "spinning" when the clutch has been released. The clutch is also provided with a brake to better control it.

Heavy Transmission Case and Assembly.

The transmission is cleverly designed and powerful and is constructed to endure hard service. Reversing common practise the upper half of the case is supported by the frame and in this are mounted the clutch pinion, main shaft and countershaft, these being retained by collars. The case is of manganese bronze having a tensile strength in excess of 68,000 pounds to the square inch. The bottom section is really an aluminum oil pan which is holted on. This pan



Forward Suspension of the Locomobile Five-Tan Track, illustrating the Wheel Cantrol, Streeting, Conpecting and Tierods, Front Axle Section and Spring, Spring Cilps and Spring Shackirs,

may be removed to fit onesect the transmission, and the clutch pinor, main shaft or countershaft may be removed without dropping the transmission or removing other parts. The case is hinged in front to a channel section cross member and is supported behind by the jackshaft bousings, which are botted to it to form an literary part. These jackshaft

housings are held by spherical bearings in cast steel brackets builted to the chassis side meta-This construction prevents distortion of the chassis straining or in any manner affecting the transmission, as the transmission case will adjust itself in the spherical bearings. All shafts and members of the transmission are mounted in extra large roller bearings save the onter bearings of the jackshaft, which are of the annular ball type. The transmission gearset is selective with four forward speeds and reverse. The transmission gears have faces 1.5 inches wide. They are generated on a gear shaper instead of being milled, so that frictional losses are minimized. The countershaft gears are boited to the ground faces of flanges, the shaft and flanges being cut from solld metal. The main shaft, instead of being square, has feather keys cut from

the solid this giving a greater cross section and increased strength. This design and construction produces a transmission assembly that will endure extremely heavy ser-

vice with a margin of safety far in excess of all needs.

The jackshafts are, like the main and countershafts, with large cross section and are of a special alloy steel. The squared ends of shafts fit into the differential hevel gears. The outer ends are tapered and on these ends are mounted the service brake drums to which the front drive sprockets are boited. In the right housing is a compact and strong differential lock so that both wheels may be driven as one in the event of necessity, should but one wheel have good traction. The service brake is actuated by a foot lever. The service brake drums are 13.5 inches in diameter and three inches wide, about which brake hands contract. This brake has a frictional area of 255 square inches and because of the chain reduction has as much efficiency upon the rear wheels as has the internal expanding emergency brake. The emergency brake drums are 18 inches in diameter, 4.5 inches face, with frictional area of 355 square inches. These drums are within the cast steel sprocket drums and are firmly boited to the rear wheels. Both brakes are equalized and either will hold the truck with a full load on much steeper grades than would ordinarily be traversed.

Drive Chains and Distance Rods.

The drive is by double side chain of two-inch pitch with rollers 1.125 inches in diameter and 1.25 inches wide, with strength of 44,000 pounds, with 12-tooth front and 35tooth rear approcket. The approcket reduction of the truck exhibited is 2.92 to one and the reduction on fourth speed between the motor and rear wheels is 12.38 to one.

The relation of the rear axie to the jackshaft is preserved by heavy distance rooks mounted at either side of the chassis frame. These rods are channel section and are stored and the state of the chassis frame. These rods are channel section and are forward ends are fitted with adjustable broase bushings in which are switeled yokes, the forks of which fit around and are holted to bosse on the jackshaft brackets. This construction permits chain adjusting, and serving as unit versal connections the rod is relieved of undue stresses, while the springs are protected against the driving strain. The rear axie is of alloy steel, 3.5 inches deep and 2.5 inches deep

Wheels and Springs.

The wheels are mounted on roller bearings of far



Rese View of the Locomo bile Five-Tan Chanels, Hispinying the Heavy Frame Countriestims, the Wheels, Springs, Jack Spring, Brake Brum, Hear Sprocket, Spring Shackles, and Sprags.

greater capacity than they will ever be subjected to, being guaranteed to resist at the rear wheels 17,000 pounds to the axie, which will not be reached under the heaviest over-

load, while their size minimizes the wear. The spring saddies are fitted around the rear axle and from these the emergency brake shoes are supported, this bringing the braking strains upon the rear axie and relieving the springs of heavy stresses. These rear springs are semi-elliptic, are of 50 inches length and three inches width, with capacity of 6000 pounds each. Fitted above and paralleling the rear sxle is a jack spring carried on a chair mounted on diagonal frame members reinforced by heavy gusset plates at top and bottom. This is intended to absorb severe road shocks and to protect the rear springs against overloading. Should there be occasion to carry a load that would necessarily be on a small platform area, not distributed over the entire machine, this construction would protect the rear springs. The front springs are semi-elliptic and 42 inches length and three inches width, with capacity of 2000 pounds. All springs are retained by heavy clips which fit grooves in the spring clip separators, thus preventing movement of the springs in their saddles.

The extreme care taken in the suspension construction is demonstrated in the spring link holts and sharkles. With one shackle the hardened steel link pin, which passes through a bronze spring bushing, is welded to the shackle to form a unit and prevent any movement. The other shackle for the same spring is botted on. All spring link pins have grease ways and are drilled to distribute grease from the cups, which are cut from the solid metal and are integral with the bolts. The spring brackets are steel castings riveted to the chasis frame by 3.75-inch rivets. The eyes of these brackets, through which the spring shackle boils pass, are bushed with phosphor bronze.

Chassis Frame Details.

The chassis frame is in keeping in design and construction with the other features of the truck. It is of channel section pressed steel alloy six Inches wide and 2.5 inches deep, and .3125 inch thick. The six channel section cross members are heavily reinforced at top and bottom by large steel gusset plates. Few holes are made in the members and these are drilled and reamed instead of punched. All joints are hot rivered, the .375-inch rivets being carefully headed, inspected and tested. The wheels are of cast steel which are stronger, lighter and are not affected by road shocks. The rear wheels of this truck weigh more than 50 pounds less than similar wooden wheels. It was determined by the engineers after exhaustive experiments that much of the resiliency with wooden wheels was due to the movement of the members in the sockets, which was regarded as being a destructive influence. The wheels used are 40 inches in diameter, it being believed these are more economical of tires, afford larger clearance, and give easier traction. The rear tires are dual, each tread six Inches, and the forward tires are single tread, slx inches wide. This equipment is believed far in excess of any requirements and ought to minimize the tire expense.

Control Members.

The control of the truck is hy a wheel mounted on a vertical steering column, the gear being of the screw and nut type, a triple thread screw of large pitch being employed. In the design large bearing surfaces have been provided to insure against wear, and to compensate any wear by adjusting bushings and nuts. The connecting rod and the rod constituting the linkage between the steering knuckles are 1.37 inches in diameter, steel tubing, with universal joints. These are behind and have the protection of the front axie from road obstructions. The throttle lever is mounted on the steering column and a foot accelerator is available for use in heavy traffic, so that the driver may have both hands free. There is no hand ignition lever, the Bosch magneto firing the motor 19 degrees before top centre, and when starting the hattery circuit fires one degree after top centre. There are separate pedals for the clutch and foot brake, and side hand levers actuate the emergency brake and effect the changes of speed.

The motor assembly is covered by a superstructure that also carries the driver's seat and which may be quickly removed should it be necessary to grind the valves, for instance, without removing any of the control spaparatus. The driver's seat is hinged to be turned or folded backward on the truck deek, and the aluminum floor boards and the sides of the superstructure may be removed to inspect the motor. The gasoline tank, of 25 gallons capacity, is beneath the driver's seat and is connected with the carburetor by a flexible metallic tube.

The Locomobile truck equipment includes standard accessories and tools, such as Prest-O-Lite tank, odometer, imps, jack, repair kit, etc.

NEW REMY LOW SPEED MAGNETO.

A new type of magneto, specially designed for trucks of tractors employing low speed heavy duty motors, is announced by the Remy Electric Company, Anderson, Ind., maker of ignition specialities. The new product is listed as type RF and has three sets of permanent magnets, large laminated inductors, ample stationary winding and a heavy oak coll.

Before placing the device upon the market It was subjected to most extensive tests for electrical and mechanical efficiency and it survived these successfuly. In addition it is was subjected to endurance tests in the Remy plant and at laboratories of various motor car manufacturers. It was particularly subjected to throttling down trails.

The new magneto offers all of the details of construction found in the new Remy multi-cylinder high speed magnetos, and is designed to withstand severe service. All wearing parts are of the best chrome vanadium nickel steel, carefully and scientifically measured and tested for hardness and wearing qualities by instruments such as the scienceope and other devices.

The magnets are of the finest tungsten steel, heat treatden hardened by a special process in the Remy plant. The inductor shaft is of high grade steel and ground accurately to size. The cams are of chrome vanadium nickel steel, ground to size, inside and out, fitting the magneto shaft perfectly. They are hardened in a special furnace equipped with a pyrometer linearing accuracy in temperatures.

The cam house of the new magneto is smaller and more refined than herefolfore and incorporates effective improvements, retaining at the same time all of the Remy standard features of outside adjustability and simplicity. The contact acrew is held by a lock spiring and to make an adjustment the former is pulled up and the serew turned a few notices. This makes it possible to set the device accurately without tools of any kind. Inside of the cam house is an oiling wick which sets against the cam, ensuring proper lubrication at all times. The cam house, which is removable, is held in position by a stiff spring mounted on a stud which projects from the hase of the magneto. The distributing parts are constructed of a new material known as hakelite. Special magneto cone type ball bearings are employed to eliminate noise.

SAMPSON DEVICE FOR WINTER DRIVING.

Recognizing that winter gives delivery systems their severest tests, three important features have been incorporated in Sampson trucks, made by the Aiden Sampson Manufacturing Company, Detroit, a constituent of the United States Motor Company, New York City. These consist of detachable hubs, by means of which a change to winter equipment may be made quickly; a differential locking device for securing traction with both rear wheels, and an enclosed chain drive.

ANTI-FRICTION BEARINGS FOR WORM GEARING.

Victor W. Page, M. E., Again Makes Reply to Criticisms Offered Concerning His Original Discussion of This Interesting Subject.

C ONSIDERING the subject of anti-friction bearings for worm gear mounting in the December issue of MOTOR TRUCK, Victor W. Page of the New Departure Manufacturing Company, Bristol, Conn., arrived at conclusions which were questioned by H. Kerr Thomas of the engineering force of the Pierce-Arrow Motor Car Company, Buffalo, N. Y. The discussion was continued in the January and February numbers, in the latter of which John Younger, also of the Pierce-Arrow engineering force, united with Mr. Thomas in questioning Mr. Page's position. Again Mr. Page makes reply and MOTOR TRUCK believes the discussion is of sufficient interest to its readers to reproduce the entire letter with accompanying drawings.

Editor, MOTOR TRUCK, Pawtucket, R. I.

I am to due receipt of your favor of the 31st ultime and too in due receipt of your favor of the again destre to express my thanks for your courtesy in permitting me to answer the fet-ters of criticism, respect of which you en-cline. I have read these over carefully, and while I can now see that I made un error of some magnitude, still I am not convinced that my critical are analysis or seen to see some magnitude, still I am not convinced that my critics are entirely correct in all their statements and I am sure that sof my remarks have been misunderstood.

As the article in question dealt with a main idea of adaptability of double purpose bearings to resist both thrusts and radial leads and not with points involving worm scaring design. I feel that the criticisms gearing design, I feel that the criticisms of leath Messrs, Thomas and Younger regarding my practical experience with worm gearing my concean experience with warm gain in my original arti-cle direct reference was made to the loss of efficiency when plain collar bearings were used to restal thrusts, in order to make the advantages of anti-friction forms clearer. Arguments advanced regarding difficulty in securing adequate lubrication and coefficie of friction applied specifically to plain collar forms of thrust bearings and not to worm gears. As Mr Thomas agrees with me that these are not sulfaile, and that he would never advocate their use, I can see no reason why further discussion of this point should be made. It is admitted that one of the ob-jections to their use is difficulty in oiling and power loss if subjected to more than moderate pressure

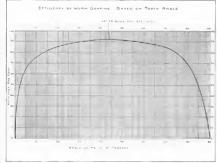
In answering the cittlelems agent my reply to Mr. Thomas it is necessary to remind your correspondents of one important fact, and that is, that I did not attempt in pose

Germen') stated so, and did not attempt to at-lask worm scription, as Mr Nomeer and subscied by their justifiable defense of norm genting. Surely the paragraph whech follows taken from the original discussion, would be did noted any finguist that I winted to pose as an author-ity. The not the purpose of the writer to consider design or analyse closely the methods of obtaining accurate tooth or analyse closely the methods of obtaining accurate tooth resourced are not for the most of the state of the state of the reconsider are not fire times to the state of recognized as one of the important conditions making for sucmake a discussion which pertained only to the adaptability of the double purpose bearing for resisting both thrust and radial foods on exposition on the merits, Judiciation or design of worm driving gearing

If in his tepty to Mr. Thomas' first letter, the writer brought forth facts to prove that plain collar type hearings were not sutlable to take worm thrusts, it was locause it was like point that was considered in the original discussion and not diffi-culty in norm gear lubrication. No point was noa6-that worm gazers could not be inherented satisfactorily. Surely the results obtained in actual practice would prevent any one even remotely familiar with automobile construction (and even withthe odvantages of the correspondence course so entreetly recommended by Mr Youngers, from making a statement on widely appared to actual facts. The point was made, however, that there would be difficulty to securing adequate worm lightcation if the thrust were 23,000 points while the gearing was in operation, the truth of which will not be questioned as Mr. Thomas has made plain that this presented to the control of t sure only exists at a time that are would not need any lubri-

it would seem that the fact that no git would be oresent beexcen the teelh did not matter much, one was or the other Let it be remembered, however, that Mr Thomas estimate of the maximum toal estiting, or 20000 paulas, was figured when the gearing was at rest and was compared to the loads given by the writer when the gearing was in motion. This fact alone would account for considerable discrepancy between flaures, even assuming that both of us were correct in our original statements. As Mr. Thomas did not fully qualify this oliginal Fightments. As are tummed out not tury quarry con-rating, or rate clearly the conditions abtaining at the same-time the load existed, the witter assumed that comparison was made under the same conditions that existed when he made his deductions, that is, with the gearing in operation

There was an error of some magnitude in following out the writer's original article, and both Mr. Younger and Mr. Thomas are right in stating that my first Younger and Mr. Thomas are right in stating that my first estimate of touth pressures was too Inw. I lawe earefully game over my original figures and corrected the error. No yeaps except gross carrelessures on my port in going over the matter too finstilly can be given for the original error. Need-less to say, bud the problem been one of actually selecting



as an authority on worm gear design, and Charl Showing Efficiency of Worm Gearing, Gives a Value of SS - Per Cent. for distinctly stated so, and did not attempt to at-

bearings for a typical installation and making recommendabratings for a typical installation and making recommenda-tions, it would have been settled in a much different manner. A graphical layout would have been made and checked aver be comjected eighters before any size were recommended? Mr Thomas will uverlook my first joine, at what on more mature reflection i see was well meant criticism on his part. and attribute it to zeal in defending the up-fulness of a bearleg that has so thoroughly proven its worth, rather than be-norance tas Mr. Voonger perhaps a little too hastity assumed; I wish to express my thanks for his calling my attention to errors of some magnitude

refers of some magnitude.

J wish to assure both of these centlemen that f do not question their experience with worm scarbia, and I questioned their experience with some investigation and ferticise their bods much beautings showed it would be difficult in use those if the loads were exceptionally high and the speed of rotation did not dismiliteli in proper retio to after co

Consider the combitions stated to Mr. Thomas where 20 000 ounds is given us the pressure between goor tretterated by alth rause the engine to stop become the textstance is so aith game the singine to stup become the test-same he an much greater than the force applied to I'm worm scar or sharf. In either of these cases, the worm restain is very sing. It may that of feeking it may be wrong restain is very sing. It may be that of feeking it may be supported upon the feeking of the pressure addition he were the testic under these life that the pressure addition he were the testic under the single property of the same than the same that the same that the same that the strength shows the same that the feet does not satisfact of cookies.

when running at very low speed." The slower a ball bearing of siven size turns, the greater its load carrying capacity. For instance, a bearing of the cun and cone type having 25-degree instance, a bearing of the cun and cone type having 25-degree instance, and will carry but 15 younds threat at 2000 revolution 15 years of the cun and cone type under thrust coals in our as high as that of the usual ball thrust washer capacity of a bearing of the cun and cone type under thrust load is not as high as that of the usual ball thrust washer particularly and a horizontal plane or parallel to the contact practically at a horizontal plane or parallel to the contact practically at a horizontal plane or parallel to the contact practically at a horizontal plane or parallel to the contact practically in the hearing. With a ball time the number of balls used in the hearing. With a ball time the number of balls used in the hearing. With a sixtup power will be less with increasing the time the hearing be rotated, the load capacity decreases when the number of revolutions increase.

Assume that a pressure of 20,000 pounds exists between the treft when the wheels skild from a well applied braking effort. At this time the wheels are stationary or they would then the stationary of the stationary of the stationary of the words are moving slowly, the warm shall is movine correspondingly slow. Therefore, when the conditions are such that the worm teeth are subject to a threat of 30,000 pounds, they are also favorable to the bearing, whose expectly for resolvent productions of the stationary of the stationary of the slow speed of owns retailed.

Mr. Thomas has considered the loaded rear end weight of the truck to be 15,000 pounds. Perhaps this is right for the truck Mr. Thomas is interested in, but reasoning from current pracilie, it does not seem reasonable to impose such a proportion of the load on the rear wheels, as this appears to lee. motor, both Mr. Thomas and Mr. Younger have worked from the other oil of the vehicle. The wiler is still under the Impression that the flutters stated by Mr. Younger are too blash, the torque of the motor which must be considered a factor of some moment, inasmuch as it is the pressure resulting from it between worm and sear teeth that produces motion of the

In essection hall bearings to resist the loads silven, we will not attempt to consider the londs band when reverse scars are engaged, in fact, common hearing in several scars are engaged, in fact, common hearing in several scars, and the several scars are engaged, in fact, common hearing in several scars, and the several scars are scars as the several scars are scars, and the several scars are scars as the several scars as the several scars are scars as the several scars as the several scars are scars as the several scars and scars are scars as the several scars are scars as the scars are scars a

ower; in fact, less than half that of the worm when it is on intermediate or second speed. This bearing bas a bore of 23 inches, an overall diam-eter of 6.875 inches and uses nine 1.375-inch balls. Now, this is a fair sized hearing, and yet according to the tables prepared presumably for the guidance of engineers, this bearing will not support this load safely at specils in excess of 200 revoltions a minute. At speeds of 500 revolutions we find that bearings 1308, 2308 and 3309 will sustain a load of 3510 pounds, or a little more than half the load determined to exist by Mr. Younger. This is also a respectable size bearing, as the bore is 3.5 inches, the diameter 7:125 inches and 11 1.25-inch balls are used.

Seeking still further we fall to find a bearing litted equable of taking the load said to exist by Mr. which the throat exists. At the other hand, take the condition stated by Mr. Thomas, or 20,000 pounds on the teeth of a stationary worm, the teeth of a stationary worm, in a crane hook thrust bearing, where movement is very slow. In a crane hook thrust bearing, where movement is very slow. In 100 pounds are the stationary words where movement is very slow. In 100 pounds are the stationary words 100 pounds are the stationary with 100 pounds arising the conditions 100 pounds arising the conditions 100 pounds arising the paring, it is a fair

de on Warm Teeth When sleed one as has been shown previously and could be used reapacity was adequate to sushiy. If its thran-resistinc can pacity was adequate to sushiy. If its thran-resistinc can Mr. Younger at 560 revolutions a minute, but it is not liere, then, we have the peculiar condition of a bearing crusting of taking the maximum threat under one condition, being entireother conditions of speed, or down one-offin its value under other conditions of speed, or

other conditions of speed.

In the conditions of speed in the critics in clustering in load that the critics are the first final conditions are the single class bearings used when these pressure obtain are very much overloaded unless they are of very ingre-size. By the use of else bearings used when these care employed, it makes an increase respired, but when these are employed, it makes an increase are employed, it makes an increase are employed. It makes an increase are entirely as the same number and if the bearing size is kept down, the number of balls and carrying councily are reduced which makes it impersive to use larger bearings are the loads assument, a self-evident truth that seemingly is not considered which makes it impersive to use larger bearings as the loads assument, a self-evident truth that seemingly is not considered in flauring bearing capacity. It would be very difficult the thrust loads were as high as stated. I agree with Mr. Younger that it would take a bearing at least 12 liches in the thrust loads were as high as a stated. I agree with Mr. Younger that it would take a bearing at least 12 liches in the capacities listed in bullating considered. This will only regulation to the proposition of the will only regulation to the proposition of the will only regulation to the proposition.

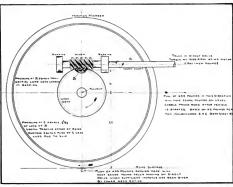


Fig. 1—Guttining Conditions Assumed in Hetermining Thrust Londs on Warm Teeth When Truck Is on Direct Drive.

The weight for a five-ton truck chassis and body, obtained by taking an average of the published weights of eight American king an average of the published weights of eight American based on the published weights of eight American based on the published with the published weight of the published with the published weight of the published weight of the published weight of the published weight of the published with the published weight of the publi

In contending that the loads would be as given, the writer flurard from the power plant and back through the general flurard from the power plant and back through the general in order is find the greatest pressure which would be present while the general was in motion rather than all rest. One name was taken of the power loss due to general bearing and not the primary enables power must be considered in basing the size of the learnings to be used to resist both threat one, while the writer hand shi figures on the torque of the

direction, which means that two of there, as well as two radials bearings, would be inveded to support the worm shaft.

To show that double jurpose bearings can be used for worm gear mounting, let us consider the load imposed by the engine, compare it to the tractive effort needed to maintain motion of the vehicle and arrive at the load existing between the teeth of worm gearing by considering the power applied rather than the resistance or push at the contact point of used and wheel, aid to exist by Mr. Younger Obviously, this must be less than the useful energy given to the gearing or the must be less than the useful energy given to the gearing or the visible will not move. An engine of given power can give while will not be a supported by the property of the a definite pressure between gear teeth. This pressure must be greater than resistance to while movement if the engine have sufficient power to propet the vehicle. Notitive Mr. power heads be nelvoust to dive a fix-tion track under race sonable conditions. The writer will endeavor to show the line of reasoning be believes correct when determining bearto resist loads caused by pressures existing between

gear teeth which must be taken when this gearing is in mution, and not at rest. Let us endeavor to arrive at the reason for the variation Let is a character to make the writer in this letter and those between the loads given by the writer in this letter and those stated by Mr. Younger in his. Evidently, Mr. Younger has assumed that practically the same power is utilized at all stated by Mr. rounger to the same power is utilized at all assumed that practically the same power is utilized at all assumeds which is not true. The road resistance is much less when the second speed gearing can be used than when the low gears must be employed. The gearing is used so the en-

gine can be run up to speed and maximum power obthe resistance is too high to permit of the truck rect drive. (thylonsiy, it is not just to base the tooth pressures on the amount horselwer motor, by multiplying this by the speed of the vehicle disregard the other and conditions 1 recognize n original articles the loads too low, which I would have discovered soon had I checked up the matter carefully. In his haste to defend worm gearing, make an error and figure his toads too bigh?

In my first article onsidered the matter sole ly from the point of view of the bearing enthusiast and when the loads worked out so favorably to ball bearings, I did not give the matter the thought it deserved Mr. Younger con-siders the matter of load solely from the point view of one interested in worm gears In one case I was satisfied to find the pressures and nulting thrust and radial low loads thought only of hearings

thought only or nearbigs At the other band. Mr Younger tries to make the tooth pressures as high as possible with a given horsequence to show the value of worm gearing. This leads both of us to make statements that are open to question and an unprejudiced engineer who followed the controversy might be forgiven for suggesting that a review of the elements of mechanics would benefit us both. In making an effort to end the controversy with this reply I will try to more fully into the solution of the problem than either I or

more they not the soturion of the problem than either 1 or my critics have previously.

In his figures, Mr. Younger takes the housepower delivered, the worm when the change speed gearing is in operation at too high a value, because he quotes an ideal efficiency. While the motor delivers to horsepower at 1900 revolutions a minute confiderably less than this will be imparted to the worm gear eith by the worm. Two main sets of losses must be taken considerably less than this will be imported to the worm scan main set of houses must be taken fully bits account. For small sets of houses must be taken that bits account to the set of the set of the change speed gearing is in operation. Second, that existing as the driving nears at all times they are in mution. On the more must be considered first, then the other less deducted when on the other speed ratio.

writer agrees with his critics that his first figures were wrong, but cannot see how transmission losses one be diregarded. When on the low and intermediate speeds there diregarded. When on the low and intermediate speeds there are two pairs of gears and bearings working, besides the driving gearing. Considering a loss of 12 per cent for the change speed gears the 47 horsepower delivered to the front end of the gearsel becomes but 41.3 horsepower on the drive shaft, which in turn becomes 15 per cent, less tassuming a worm gear efficiency based on teeth 26 degrees 45 minutes anglet, or about 35 horsepower at the worm wear teeth. figuring pressure existing between worm and worm gear teeth the materially reduced power effort, which is directly affected

by the entering torque, must be taken into account.

The loss due to driving through ordinary worm gearing is greater than five per cent. It will more often reach a value of 15 per cent, loss as shown both by chart presented here-with and by formulae given in original article. On the reserme drive we would not be delivering 35 horsepower to our worm gear but the energy applied would be about 34 horsepower because of the 15 per cent, loss in the gearset with reverse gears in mesh. The actual pressure existing at worm verse gears in mesh. The actual pressure existing at worm gear pitch circle must be computed on this basis because of driving searing losses. This might be reduced further by driving shaft angle and universal joint loss. We will disregard this, however, in the case in point, and assume that the truck has a straight line drive with no possibilities for power less except through the gearing and it must be apparent that the gearing considered would have a materially lower efficiency than the form which Mr. Younger has in mind.

in basing his estimates of power or push exerted at rear wheels he has considered that his worm gearing is working under such conditions that it has an efficiency of 95 per cent. lie also disregards my stated efficiency of 85 per cent, and substitutes in its stead his own value. I based the value I gave on the chart presented herewith, the exact derivation

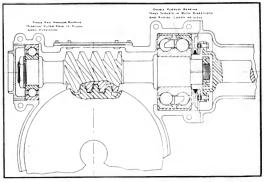


Fig. 2-Suggestion for Mounting Double Purpose Bearing to Resist Thrust in Twn Directions and (arry Radia) Load as Well-Note Simplicity of Housing and Unit Construction of Thrust Member

of which I am not familiar with, but which I used because it appeared reasonable and checked up the formulae. I would like to call Mr. Younger's attention to the fact that in the case stated the angle of thread was 26 degrees 45 minutes It ing the chart I found that the efficiency given for this thread angle was about 88 per cent, checking my previous calcula-Taking into account that this related to perfectly chined and fitted worm gearing; in fact, a tool room job rather than a regular commercial proposition. I deducted number three per cent, to take into consideration any defects which would make the actual efficiency less than that given in the chart. In view of this explanation, I feel that I was taking a safe value for the efficiency and ask why Mr. Younger should object to my retaining it in my calculations involving this specific case and not the nearly perfect worm gearing has designed, and probably has in mind when he gives the higher efficiency. In fact, the chart shows that with a touth with a touth andle of 43 degrees 34 minutes we reach the maximum value, which is given at but 92 per cent, this being less than that used by Mr Younger. Considering tractive effort needed for commercial vehicles

with solid tires as given by Churchward on S. A. E. data succet with solid lifes are given by Churchward on S. A. F. data sucet. No. 5, we find a value ranging from 1s to 25 pounds a ion given for level asphalt. Multiplying the maximum value of 25 pounds by 175 which is the ratio the tractive effort required on cobble stone paring brars to that needed on level asphalt, we arrive at the conclusion that a drawbar pull of 45.5 pounds will keep a ton load moving if this be supported () () ()

by mixing members. This is a high value and it will probably of 455 pounds would mave be more apall on push of 455 pounds would mave let loss, or the loaded weight of the average flevion track after it had one been started. Operated under these conditions, the direct drive replication of the worm gear test by the engine and see if it will supply the necessary tractive effort to the tires of the driving which is necessary tractive effort to the tires of the driving which of the probability of the probab

stant 62 as a value based on 1900 spans.

Substituting known yadies we have to occupe at the centre of the worm shaft of walking we have been of the worm of Li liceles we get a local to the product of the worm of Li liceles we get a local at the worm teeth of 154 pounds. This, minus loss, is applied to the short arm of a simple lever of the first class visib the folicious between the product of the short arm of a simple lever of the first class visib the folicious for the pressure applied at the short end will be reduced to less than a third at the long end. Taking a gear "effective of 55 per cent, we will have an actual pressure of 159 pounds at the short arm of the lever. Dividing this by the ratio of leverage has been a substitute of the perhyberies will be about 310 pounds.

In this connection the writer would say that if the were collection to the state would say that if the were collected to the state of the

In this connection the writer would say that if he were considering a truck design, he would provide a lower ratio of drive than eight to one, especially if 40-inch wheels were used, because the vehicle speed under these conditions would

Using the same formulae given in the original article, but supplying correct values in this instance, larrive at very much the same conclusion reached by flagring tooth loads from entoring torque of motor at the worm. This line of reasoning to worm gear which is turning at 125 revolutions a minute with truck on direct drive.

to worm gear which is turning at 125 revolutions a minute with truck on direct drive:
First find turning moment on worm gear shaft by the following formula.

63.025 x H iv. 63.025 x 40

$$V = \frac{63,025 \times 11 \text{ P}}{N} = \frac{63,025 \times 10}{125} = 26,168 \text{ inch-pounds},$$

To find moment on worm shaft we can use the following formula:

$$TW = \frac{T \times i}{E \times N}$$

- = 2965 Inch-pounds.

Where—
T = Twisting moment at worm gear shaft,
1 = Index of threads, 1 for single, 2 for double, etc.,

E = Efficiency for gearing, N = Number of teeth in worm gear, Substituting known values we have:

To find pressure ni plich line of worm we use the expression:

P =
$$\frac{Tw}{H}$$
 or $P = \frac{2965}{1.5} = 1976.6$ pounds.

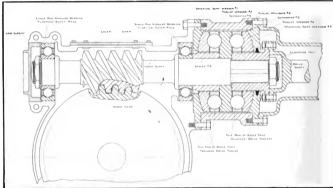


Fig. 3.—Depicting Installation of Thrust and Radial Bearings Accessary to Replace the Donbte Purpose Unit Bearing Shawn at Fig. 2.—Note That Eight Separate Pieces are Employed in Thrust Washer Assembly Excinsive of Balls, and That a Single Row Annalm Bearing Man to Lord to Recein Radial Lond.

be too high for a truck of five our exparity, Ae m a strengt was made in the ordinal article to consider saything but beening mounting suggestions, it is not accessary to analyze too deeply a set of conditions relating to truck design or worm gear construction only assumed to make the main idea, that of have assumed a condition which does not exist in practice; that is the spiciosition of all the power at the rim of one driving wheel. This does not aller the reaction is do no worm conto to be moved and considered as resting on the rear wheels, but the moved and considered as resting on the rear wheels, but the moved and considered as resting on the rear wheels, but the moved and considered as

Take the other extreme case, where the tooth pressure would be greatest or when the reversing gear was engaged, we can arrive at the pressure at the worm pitch line by using the formula which follows:

can arrive at the pressure at the writer in formula while
$$52,925 \times 11 \cdot 12$$
.

P = $\frac{52,925 \times 11}{11 \times N}$.

Where—

I = Haddits of worm, furtions a minute Substituting known values we have.

8ubstituting known values we have.

1 = $\frac{60,925 \times 49}{1.5 \times 2.59} = 6722$ pounds.

The figures obtained by either method are very nearly the same, and if a pressure of less than 2000 pounds at the worm pitch line will drive the truck on the direct drive, and if this is a maximum that we can obtain from our if horsepower engine after hosses are considered, it is difficult to see how a fever which decreases the foat insigned of authoritying it can tact of the wheel with the ground, under the conditions stated and shown at Pitc. I, herewith.

The load on the worm grat texth cannot be taken as the sommet of end threat on the hearing, however, as I will be resolved into radial and thrust load components, the relative value of which will vary with the thread analyse and the extent of which can only be determined properly by considering a carefully made graphical alroys of the gearing in question, and the state of the sta

Considering the threat load to be resisted by the hearings, we will see if this is so hish that it cannot be taken by a double purpose hearing of proving the transpose hearing of proving the proving

a 12 per cent, loss in the change speed gears before figuring the power applied to the worm. Instead of 4 fore-power which is applied to the front end of the gearset, we have 41.35 horse-power, delivered to the worm shaft at 50s revolutions a minute. To find torque at centre of shaft we use the formula. 4.825 × 11. P. 6.255 × 41.36

P = _____ = 5213 4 Inch-pounds

Hividing this by the radius of the worm we get a work pressure of 2475 pounds. Not all of this load is a thrust to be taken by the hearing, however. Taking the highest value, we taken by the hearing, however. The hearing the same pounds of the present the same and the same pounds. The hearing to be used, if you must be successful to the same that will sustain 2000 pounds at 500 revolutions a minute that will sustain 2000 pounds at 500 revolutions a minute.

If the conditions be as stated by Mr. Younger and a load of simp points is present when the children in intermediate every work of the present when the children is intermediate every work of the children in the children is the children in the children in the children is the children in the children is to the sear by the engine in order to produce vehicle movement. This would mean that an entering torque nearly, twice as creat as but obtainable from the engine considered in this as creat as but obtainable from the engine considered in this need to be doubled to impary sufficient storay to the worm of their the loaded track if this wore the correct amount of

pressure exheling between the teeth.

The resound for the writers previous remarks in replying to
The resound for the writers previous remarks in replying to
due more to enhantantly defense of these supposed and were
due more to enhantantly defense of the replection of the
face's of the case in point. Mr. Thomas statement that hearface's of the case in point. Mr. Thomas statement that hearpresent by the writer in the first article or they would fail
in secritic, was correct, and I see no reason for questioning
on the statement of the conditions which are present

at the time this load obtains

Mr. Younger, at the other hand, goes on record in saying that It would not be possible to provide a double purpose bearing less than Iz or IS inches in diameter to reselv sorm tention be cities pressures twice as great as those the writenow believes to exist after revising the faulty fluoring which make were no injustice to the power transmission qualities of worm genting, surely Mr. Vouncer's statement based on "defiproven to be right, might be misconstructed by other residenand double purpose half bearings thought unsuitable for supbern used for this purpose with success.

If we consider, as is general practice, that the hearing should be selected with reference to thrust to be resisted on the intermediate gearing, we find that a double purpose hearing So, 45 in which a 45-degree tool line will estatu a thrust of subrabily less than 15 inches in diameter: in feet, the outsiddiameter is 1-801 inches. The horie is 2505 inches and it is but 325 inches in width. Ten 125-inch baths are used a row, which all just zero to calce, built replace the tous thrust washes.

ers and the radial hearing depicted at Fig. 3.

To make the advantages more apporent, let us see what size built branes of the conventional type would be needed. We find that a No. 2309 listed in Builetin No. 25 of 8 It B. Company will take a load of 2510 pounds at 350 revolutions a minute. This has a breef 25 incles and is 1125 inches in district this base above of 25 incles and is 1125 inches in district this type bearing permitted it to take axial loads in either

direction, it would be necessary to use in connection with it a rudtal bearing to resist the radial component of the tangential However, it takes two of these in addition to the radial bearing to replace the double purpose member which the writer favors, and which will take thrust in either direction and radial load as well if properly mounted. The housing required for the double row bearing is just as designed for a plain radial annular bearing, and there is no possibility of dis-alignment between parts of the logaling. At the other hand, where ball thrust washers are used, they must be mounted in cultiverthin with suberical next members and if the worm or pausion must be compensated for ta condition we are all agreed should be considered in designing; the problem of mounting involves some degree of engineering and construction skill, as evidenced by Fig. 2. In either case the throat members are housed at the front end of the worm, the rear of the worm shaft being supported by a floating single row annular hearing of adequate capacity, and very easy to select from the manufacturers lists without using excessively large members

Mr. Thomas effect the maximum threat pressure as unfavorable to a double pursons bearing. Under the conditions he state, where this band can exist only when the worm is stationary mended in this letter would sensation all of this threat with out being affected in the clastic limit. I have determined the punisis in our laboratory, and surely 10 of these members, which do not vary more than 6001 line from standard size considering that the load line is angular rather than horizontal.

considering that the load line is account rather from intransition periodizing to Individual within applied specifically to plain collar types of thrust hearing, have been misconstraid to be determental to proper sown gare lightestime, which was not to see that proper individual to line. The proper individual to be that the seed of the proper individual to proper the seed of the proper individual to proper individual to be a seed of the proper individual to proper individual to the seed of the proper individual to proper individual to the seed of the t

As other remarks in Mesers. Thomas and Younger's letters are evidently based on mististerpretation of my meaning, I do not think it necessary to take any more of your valuable space admitty of the double rew hearing of practical size to resist the thrusts of worm gearing, and not lubrication or design of worm gearing. If my reasoning he correct, I feel that I have shown in the control of the c

I trust that this letter of explanation may make my line of reasoning sufficients) clear as that further controversy will be unnecessary, as the matter now resolves likely merely to one of differences of personal applica, which are its no means rare when quostions involving matchine deviage are considered ranked sittly of the property of the previous invasiranted sittly to the property of the previous invasi-

Yours very (ruly, VICTOR W, PAGE, M. E.

Bristol, Conn., Feb 6

WHITE OPENS NEW SERVICE BUILDING.

The new service building of the White Company, Cleveland, O., in New York City on West 37th street, between 11th and 12th avenues is completed and is in operation, and the location is dlead, being in the centre of the commercial district. The structure is one story but has 25,000 square fees of floor space, and a feature is the absence of posts or pillars, the roof being supported by trussed spans. Overbead lighting is employed by means of large skylights. The department for the maintenance and revair of motor cars is very complete, including a modern machine shop, carpenter shop and a large stork room in which is carried a complete line of White parts.

H. R. RADFORD HAS NEW POSITION.

Harry R. Radford, who for several years has held the position of general sales manager for the Cartercar Company, Pontiac, Mich., has assumed the management of all its interests except the manufacturing department. The change follows the resignation of R. A. Palmer as general manager. Although there was considerable speculation as to who would succeed Mr. Palmer, Thomas Neal, president of the General Motors Company, of which the Cartereac Company is a constituent, announced that it had been decided to dispense with the position of general manager. Mr. Radford will have charge of the advertising, selling, credits of agents, etc., and the directing of the seven Carterear branches in the leading cities.

BOSCH SERVICE STATIONS.

Arrangements for special installation service have been made in all brauches of the Hosch Magnot Company, New York City, so that operators of motor vehicles in the vicinty of any branch, desiring to have their present ignition systems changed to that of the Hosch, may leave their care and have the change effected promptly and at a reasonable figure.



MECHANICAL NOTES ANT

TIPS FOR DRIVERS



STEERING WHEEL COVER DEVICE.

Atibough different forms of gloves are worn, many automobile operators complain of cold hands during the winter. One of the reasons for this is that in gripping the wheel the circulation of blood is more or less impeded by the pressure exerted in holding the member. Some drivers find that the old-fashioned woolen mitten is the warmest covering for the hands, but more or less difficulty is experienced in gripping the wheel because of its smoothness.

Some drivers wrap the wheel with friction tape, and while this material eliminates smoothness and permits the use of mittens, it is extremely cold. At Fig. 1 is presented a method of wrapping the circle with felt which will not only exclude the cold but absorb vibration as well, making long drives much easier of accomplishment. To prevent the cloth from slipping, tape is employed as depicted in the

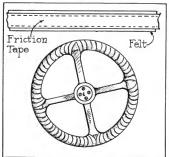


Fig. 1-Depicting flow a Wheel May Be Wrapped with Felt Sewed to Friction Tape,

drawing. This cloth is sewed to the felt and should be less in width than the softer material.

The first step is to cut the feit into strips of about .75 inch and sew together as many as will be necessary. The tape is then stitched on and the rim of the wheel covered as outlined. In placing the covering on the wheel the edges of the felt should be wrapped closely together to provide smoothness. When the circle is covered the two ends are sewed together. The tape will grip the wood firmly and being fastened to the cloth will prevent the latter from moving

SUGGESTIONS FOR VALVE TIMING.

To obtain the greatest efficiency from the internal combustion motor the vaive and ignition timing should be cor-

In the previous issue of MOTOR TRICK the latter subject was discussed and the various methods of correcting faulty operation outlined. The average driver hesitates to attempt the correction of the valve setting, and aithough absolutely accurate adjustment is a delicate task, requiring as it does the expert, considerable improvement may be effected by the novice.

Generally speaking, with the modern motor there is littie to cause the vaives to become out of time, but wear at a number of points, such as cams, rollers, tappet rods, plungers, etc., will bring about a loss in power. The constant hammering of the tappet against the valve stem sometimes results in these being flattened out, causing the valve to open too late and close too early, or not lift high enough and thus retard the flow of gas to the cylinder. Excessive wear of the teeth on the crank and camshaft, or if either be loose, will affect the operation of the cams and consequently the timing, but with the large gears such as are now utilized in motor car construction, the amount of wear taking place will not make any great difference. And it may be stated also that considerable improvement has been made in the design of valve mechanism, eliminating much of the former troubles.

The correct opening and closing of valves is marked on the flywheel by the majority of manufacturers. These figures and their application puzzle the novice, but are understood easily if the motor's cycle of operation be taken into consideration. The figures, 1, 2, 3, 4, represent the cylinders while the letter I means the intake valve, and E designates the exhaust. Thus, the marking 1, O. 2, 3, signifies the opening point of the intake valves of the second and third cylinders. Another set is 1, C, 2, 4, which denotes the time the intakes close. When the letter C is employed alone it indicates centre.

The explosions of a four-cylinder, four-cycle motor do not take place in consecutive order; that is, the arrangement of the crankshaft is such that two pistons are up and two down at the same time, as will be noted at Fig. 2. In this instance the first cylinder, usually that nearest to the radiator, is about to be ignited by the spark while the fourth is about to take in a charge of gas. The pistons in the second and third cylinders are nearly at the hottom of the stroke and these are exhausting and compressing, respectively.

The order of firing is 1, 3, 4, 2, and it will be seen that the first to explode is No. 1, the next No. 3 and the last is the second cylinder. This order may he 1, 2, 4, 3, according to the design of the engine. In either case, however, there are four strokes of the piston and two revolutions of the crankshaft to bring about one impulse or firing stroke. By referring to the firing order below the illustration it will be noted that the sequence of the strokes is: Firing, exhaust, compression and suction of cylinders 1, 2, 3 and 4, respectively. By utilizing these tables one may become familiar with the order of explosions and these figures may be employed in timing where the flywheel le not marked.

Where wear has taken place at the tappet or valve stem, and these members are adjustable, the efficiency of

the motor car can be improved greatly by resetting to conform with the figures on the flywheet, previously mentioned. The usual method is to lengthen the tappet unit an ordinary business card may be inserted and ordinary to the conmendable a better way is to utilize the figures upon the flywheel.

Many makers fit an indicating arrow or pointer to the month, this device being installed to facilitate the operation of timing. If the engine he not thus equipped a mark may be made upon the centre of the cylinder or upon the dashboard.

As has been explained, the crankshaft makes a half revolution to each stroke. Referring again to the drawing, it will be seen that the first cylinder is about to fire and that both vaives are closed. The exhaust of the second is about to open. If the timing be correct, the indicating arrow will point to the marking E. O. 2. 3. If late, these figures will pass by the indicator and the exhaust stopet of

are thoroughly tested and valves timed to give the best resuits intended by the designer.

Where the flywheel is not marked, the timing will have to be secured from the factory, but a gauge that will prove that will useful in timing valves from the crankshaft is shown in the sketch. The device consists of a piece of hrass about, 0.625 inch thick by one wide. As the diameter of the average flywheel is approximately 15 inches, a foot of metal will be sufficient. The fraction of an inch that equals a degree is figured out and marked on the brass as depicted in the drawing. The degree can be accertained by calculating on the basis of 350 degrees to a circle size.

In using the lastrument the top and bottom centres of the fluwder are located. This may be accomplished by inserting a rod through the opening in the compression cocktom or by removing the lower half of the crankease, or an exspection plate, to accretal, when a piston is at the bottom or ton of its stroke. The rule is then laid upon the fix-

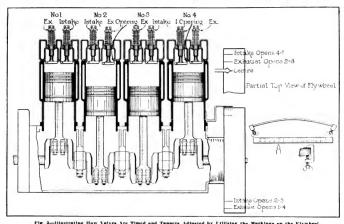


Fig. 2-lineirsting flow Valves Are Timed and Tappets Adjusted by Itilizing the Markings on the Flywheel,

	Firing Order	1-2-4-3.			Flring Order.	1-3-1-2	
Cylinder 1 1—Firing 2—Exhaust 3—Suction 4—Compression	Cylinder 2 Compression Firing Exhaust Suction	Cylinder 3 Exhaust Suction Compression Firing	Cylinder 4 Suction Compression Firing Exhaust	Cylinder 1 1 Firing 2 Exhaust 3 Suction 4 Compression	Cylinder 2 Exhaust Suction Compression Firing	Cylinder 2 Compression Firing Exhaust Suction	Cylinder 4 Suction Compression Firing Exhaust

the second cylinder should be adjusted until the valve starts to open or lift in the line.

Moving the flywheel slightly, the marks 1, 0, 4, 1, should appear as the little valve of the fourth cylinder starts to appear as the little valve. The flywheel slightly that it to some the subject of the flywheel is now given nearly half a turn when the market for the exhaust members, 1 and 4, and intake, 2 and 3, will appear and can be reculiated.

Some makers include the closings on the flywheel and these also can be checked, but many simply mark the openings as too many figures are apt to confuse the amateur. It is not a good plan to attempt improving the seiting of the valves as marked by the manufacturer for the motors wheel with zero mark under the usual pointer or arrow. The points are then marked off or compared. The device can be fastened to the flywheel by clamps as indicated in the illustration.

All correction of timing should be done when the motor is hot in order to accure the best results. The relief cocks should be opened to reduce compression so that the flywheel may be rotated easily. If the motor be not equipped with these desires the spark plues may be removed. The adjustment of the valve openings is a simple matter and the operation will be facilitated by studying the accompanying illustration, which was so drawn as to make clear the valve openings and their markings upon the flywheel.

CONSTRUCTION OF SOLID MOTOR TIRES. *

ily Charles B. Whittelsey.

SOLID motor tires can wear away and suffer as much from misuse as the pauematics, and it has been asid that lack of knowledge of them lies inzigely with the manufacturers by their never educatins, to any extent, the users of their product to an appreciation of the tremendous difficulties that have been surmouncied in arriving at the present state of efficiency—or of the endless amount of experimental work they have done, and the discovariating setback that they have had in their efforts to piace at the disposal of the public the solid motor tire of today.

Historical

It is uncertain when or where solid tires were first used for wheels on vehicles. However, their use was not common until after the year 1381, when the Carmont tire was first employed on hansom cabe on the streets of London. The tire adopted was Carmon's patent of 1881 in 1883— "a rubber tire held in rolled steel channels in a state of compression between converting flances."

The Carmont was the first solid tire introduced in America, by the late Channing M. Britton of the important New York carriage firm, Brewster & Co., for which Mr. Britton obtained the American right under the Carmont patent. Several manufacturers made tires for them.

The next practical advancement in the development of the solid tire made in America was under the patent granted to A. W. Grant in 1886, later known as the Kelly-Springfeld. This the being seated in a rim channel with diverging sides there was no loss of resilience from the compression of any part of the rubber. The channels were not as deep as in the Carmont type, and a larger percentage of rubber was available for wear. The rubber body was held into place by means of circumferential wires running through it and forming circles of smaller circumference than the rim flances. Since the latroduction of the Grant patent the use of solid rubber thea has increased steadily.

The Victor thre was similar in shape and construction to the Carmont and Grant, but the retaining wires were incased in leather to prevent their cutting the rubber. Later on, these wires were covered with specially woven fabric.

The next patented tire which was developed to any great extent was the side whre—a tire held into position by two endless circumferential wires sprung over the edges of the channel which engaged the ends of embedded cross hars, thus holding the tire securely in the channel.

These and many other solid vehicle tires were made and used on cabs, carriages, etc., until the vehicles became motor driven. The weight and speed of the motor vehicles increased as well as their carrying capacity, which made this style of tire altogether too light to perform the work required of it. This condition brought about the invention of the solid motor tire—a tire vulcanized in circular endless form to fit the dimensions of a wheel. This type has heen brought out in different designs, such as a fange, internal wire, side wire, hard rubber and metal base; also the demonstable.

Construction.

Vehicle tires were made in oval shape, in cross section from three-quarter inch to two inches, advancing one-eighth inch between sizes, and of compounded rubber which is forced through a tubing machine die, vulcanized in long modes with many cavities in the shape in which it has been

*Extract from paper read before recent meeting of the Society of Automobile Engineers.

designed. These these were cut in lengths to fit the wiscells and internal wires were incerted, of such betagths as to allow them to be spilted when applied to the wheel. The tires were then put into position in a channel on a wheelf and held by mechanical devices while the ends of the wires were brazed together, the rubber having been pushed back, affording the wires sufficient space to allow this brazing process.

What is known as the cushion solid, which is perfectly round molded rubber in similar form, with a single hole through the centre of same for retaining wires, was put into use about this time.

The construction of the solid motor tires that have been quit on the market up to the present time is very similar in a general way. The rubber is forced through a die or a ubting machine, or built up from this sheets of calendered stock in endless form to fit the exact dimensions of a wheel, on a particular style of base or retaining body of the tire, as designed by the different rubber manufacturers, according to their various ideas of efficiency, which have taken various forms, such as circumferential and side retaining wires, which are engaged over embedded cross wires; base of hard rubber in various forms, also of semi-hard rubber which can be moided into the tire, and more recently, the bilain metal hase types which are most successful.

The rubber portion of a solid motor tire is usually about 2.75 inches hith, and varies in width according to its design. The tire is built so that when it is applied over the steel band of the feltoe of the wheel it fits so snutely that it has to be forced on with a press specially designed for this purpose. This is done so that the tire will not creeped circumferentially or laterally. When the tire is in position on the wheel, it is further secured by steel fianges boiled on each side of the wheel, also to prevent its creeping or working off the wheel, also to prevent its creeping or working off the wheel.

The aide wire motor the la built in similar shape, but cross wire are inserted throughout the base of the three cross wire and aide endess circumferential wires are and at stated intervals. It is placed in a channel made for this purpose and side endess circumferential wires are applied on each side of the tire over the ends of the cross wires in the base, which holds it in position in the channel. The tire in the channel is applied over a wood or steel band on the wheel.

Metal hase tires are hult up of compounded rubber in graduated consistencies from the hard base which forms their inside circumference sext to the steel base to which it is vulcanized, to the resilient rubber that forms the wearing part of the thre. This rubber tire is vulcanized to a steel tire band which la applied by pressure to the wheel over the steel fellow band with either a hydraulic or specially built press. It requires from 90 to 90 tons pressure to anply these tires to a wheel and it has often been found necessary to use more than 90 tons to remove three so applied. This frictional contact makes it unnecessary to use any side flanges or other fastening.

Size and Shape.

The size, shape and dimensions of these types of tires are varied according to the designs of the manufacturers—no two being the same in any of these particulars. The service obtained from a given diameter and cross section is as varied as the different types. The reasons for this can be stributed to the variation in the cubical contents of the cross section of the tire, some designs having a much greater amount of rabbor than others, and, therefore,

the distribution of pressure over the different sizes of tires caused by the intensity of pressure a square lach brings a greater or lesser area of the tire in contact with the road, and as it is only that part of the solid rubber tire which is in contact with the road that is carrying the load, the tire with the greater area at this point performs the more satlafactory service.

The height of the rubber from the tire seat governs largely its elasticity and ensholing effect. A tire too high and narrow cannot stand up under a heavy load. It will weare from side to side. A tire worn down to a short distance from its non-extensible base loses its cushioning effect, and instead of the uneven conditions of the road being absorbed by the rubber, the tire is hard and transmits the shocks of bumping over it to the truck, and soon racks the truck and its motor, so that repairs become necessary.

Life of Tires.

The life, strength and durability of the tire lie primarily within the compounded rubber of which it is made. and also its construction. Other conditions being equal, the tire made of the highest grade of rubber has the longest iife and is the most resilient. Certain minerals are added to give it strength and durability, the quantities being varied according to the hest judgment of the tire manufacturer. The proper size tires which are dependent on the speed of the vehicle, applied on an electric truck driven at eight or 10 miles an hour, will give greater mileage and much longer life than the same size tires on a gasoline truck driven from 12 to 15 miles an hour. The carrying of a ton at a speed of 10 miles an hour is a very different propoaition to a tire than carrying the same amount of jond at 15 miles an hour. Greater mileage can be obtained from tires run in a city devoid of grades.

Heat is the result of motion, and as the tire when in motion is continually being pounded between the road and the ates! band of the wheel, it develops a greater amount of beat within itself, which is transmitted throughout the tire, and has a tendency to shorten the life of the compounded rubber. The heat developed in solid tires is much less is the fall and winter and spring of the year owing to the cold roads, water, anow and iee. The number of monthis service, as well as the mileage, that a solid tire may give is influenced by the same condition; also by the weight the truck has to carry, the speed at which it is driven, and the nature of the country where it is used.

Driving Wheel Diameter.

Tires on wheels of greater diameter give longer and better service, because of the greater area of raibler in rontact with the road, as well as the fact that they do not have to travel so fast, and, therefore, do not scenarie as much heat, or deteriorate so rapidly. Neither do they travel so far and wear down as rapidly as the tires of smaller diameter. Actual experience has demonstrated that big wheels and tires are better on heavy grades in particular.

Tires for Electric Vehicles.

A solid motor tire for an electric truck minst be made from a compounder tubber stock which is soft and most resulted. It must absorb the unevenness of the road, and resume its normal shape instantly, so as to lessen the traction of the vehicle. By the absorption of the shocks the consumption of electric current necessary to drive the truck is reduced to a minimum. This is largely dependent upon the resiliency of the compound, as well as the shape and size of the tire.

Many shapes have been tried out for use on electric trucks—the standard oval shape prevailing. The corrugated or grooved treads present less road contact and assist in preventing skidding. Tires moided with these grooved treads and under-cut webbed sides afford an additional cubloning effect and are very successful on electric vehicies. The styles of tires used on electrica are the same as those offered for other classes of vehicles. The size of the cross section also affects the cushloning qualities of the soild motor tire on electric trucks, and a fair comparison cannot be drawn between two makes of three, one of shich is approximately eight square inches in area for fourinels section, and the other 10 square inches; for the one with the greater area will cushlon and carry a greater load, absort the shock better, give longer life, and better service.

The life of the tire on electric vehicles is much longer than on gasonice machines—due partially to the low spine on the vehicle. From this class of vehicle being run at lower speed, it is handled with much more care than high speed truck; therefore, unknowingly, the tires receive more consideration.

Dual or Twin Tires.

Dual or twin tires are applied on the rear wheels of trucks built to carry heavy loads, and subjected to the most severe strains, as it is known that when these dual tires are of the proper size they have greater sustaining power from the distribution of the load over the two tires on a single wheel. However, it is frequently demonstrated that one of the twin tires gives out before the other—due to the fact that they have been driven over uneven roads where one of the tires on the wheel has had to carry the entire weight of its wheel a greater portion of the time and has given out from being overloaded.

Block Tires.

Block threa are sections of solid threa vulcanized to steel plates or held in position by steel sectional frame fitting over the blocks of rubber with a wider base, or protruding wires in the base. This style of tire is used principally in duals on the rear wheels of the larger motor trucks subjected to most severe work. When driven rapidly, there is but little unevenness of motion felt from the tire being so constructed. It does not generate heat within itself as rapidly as a solid tire, owing to the fact that there is a space of an inch or more between the blocks which enables the rubber to yield more as it rolls up ahead under the travelling load. There being no communicating rubber between the blocks, there being no communicating rubber between the blocks, the heat is confined in each block, which can be removed or replaced when it is injuried or work.

Block tres afford a very good non-kidding quality, and are excellent on soft roads, as there is but little alipping in wet, slippery places. In winter the spaces between the blocks pack with snow and lee, and the tire then loses its non-skidding and gripping effect. In all seasons the block tire picks up stones between the serrations, and these small stones embed themselves in the rubber, and should be taken out, with a strong acress driver or any other similar tool before they have time to cut and work into the blocks of

Demountable Tires.

The demountable solid motor tire has been too long delayed. The cost to the tire maker, truck manufacture, and the truck owner, of the delay of laying up the truck while the wheel is taken off and sent by express to the nearest branch of factory of the tire manufacturer and the old tire taken off and the new one applied is entirely too great. This expenditure of time and money will be avoided when tires are all demountable and interchangeable like pneumatics for the pleasure car.

Tire Troubles.

The greatest of solid motor tire troubles is the separation of the tread from the base before the tire has given satisfactory mileage. While some of the troubles have been due to the construction of the tires, the principal causes have been overload and overspeed. The truck manufacturers have not equipped their trucks with tires sufficient in size to do work demanded of them. The tendency is to under-rate the overload that is going to be put on the truck soon after it is turned into service, just as in the case of pleasure cars until recently. Sufficient allowance has not been made for the portion of the load that is carried on the rear wheels, and trucks are daily equipped with undersize tires that will go to pieces within 2000 or 3000 miles instead of lasting 6000 or 7000. Truck manufacturers will some day learn that the reputstion of their trucks for "eating up tires" costs them more than the difference in cost between undersized and proper size tires-a great many times over.

Standardization.

This point leads us to the standardization of the tire and wheel dimensions and fastenings, which was accomplished by the Society of Automobile Engineers on July 15, 1911. What does this mean to the tire manufacturer? The expenditure of thousands of dollars to make an entirely new equipment in which to make his solid tires to conform with the new dimensions that the S. A. E. standardized. What does this mean to the wheel and truck manufacturers?



Four Wheel Drive Truck Purchased by Government for Quartermaster's Department and Which Participated in Army Manocutres at Washington.

A saving of thousands of dollars, instead of having to universal joint permits the machine to be driven and steered carry as many wheels in stock as there are varieties of tires to fill an order for any given size. The S. A. E. standardization has reduced this to one wheel for any make of tire for any given size.

The time will come when the cubical contents of the tire will be standardized, also the demountable fastening, so that the difference in service of any given size tire will be measured by the difference in the quality of the compounded rubber that it is made of by the different tire manufacturers.

Conclusion

The pneumatic and the solid motor tires bave made the development of the pleasure car and motor truck possible, and yet they have been given less serious consideration than any other part of the equipment. A given amount of rubber and fabric can perform only a measured amount of work, the same as steel and other products, and when it is overtaxed its life is shortened exactly in proportion to its abuse.

FIRESTONE ISSUES TIRE BOOK.

Any information relative to the care and maintenance of tires is appreciated by the owner and operator of mechan- one of the centres of the platinum trade of the world.

icai transports. The Firestone Tire & Rubber Company, Akron, O., is issuing a hooklet entitled "Minor Repairs and the Care of Tires." As the title indicates it describes the beat methods for making repairs to tires and inner tubes and the brochure also contains a number of suggestions on their care and preservation. The bookiet will be sent free upon written request to the Firestone Tire & Rubber Company, Akron, O.

GOVERNMENT TESTS FOUR WHEEL DRIVE.

Announcement is made by the Four Wheel Drive Auto Company, Clintonville, Wis., that it has constructed and shipped to Washington, D. C., a 1.25-ton truck which is to be utilized in the army manoeuvres planned by the government. The order was the result of a visit to the factory by a representative of the War Department who subjected the machine to severe tests. Owing to the short time allowed in filling the order, the company was obliged to fit the chassis with a remodelled touring body as depicted in the accompanying illustration, the picture being taken on the day of shipment.

The vehicle is propelled by a four-cylinder, four-cycle, water-cooled motor having a 4.75-inch hore and 5.5-inch stroke, and rated at 45 horsepow-

er. A multiple disc clutch is fitted and a sliding gear transmission, back of which is a sub-transmission consisting of Morse silent link chain and gears. inside the driven gear is placed a differential, from which two shafts drive to bevel gear differentials on both axies, all four wheels driving.

On the shafts, near the subtransmission, is a patented jocking device, one for each member. which are utilized as an emergency device for operating an opposite pair of wheels in the event of serious damage to either shaft or axie. itoth axies are of the fuil floating type and the front member is fitted with the Four Wbeel

drive patent with bail and socket steering joint enclosed, and the

by the front axio arrangement.

NEW DEPARTURE BALL BEARING DATA.

The New Departure Manufacturing Company, Bristol, Conn., maker of bail bearings of that name, is mailing the trade an interesting 76-page catalogue, the contents of which give valuable information of technical character pertaining to ball bearings. The book will be mailed on request to manufacturers, purchasing agents, designing and mechanical engineers. The New Departure Company suggests that applications he made upon the letter head of the firm with which the person is connected,

PLATINUM RISING IN VALUE.

The price of piatinum is rising, this being due, presumabiy, to the enormous demand for the material in automobile construction. According to an official of the Remy Electric Company, Anderson, ind., the material was quoted recently at \$650 a pound in Berlin, Germany, which is



The mechanically propelled vehicle is rapidly replacing horse drawn equipment for transporting hotel guests to and from railroad stations. Not only is the service more romfortable but considerable time is saved and the progressive hotel men find the automobile useful for various other purposes, such as insuling supplies and carrying guests on trips to places of interest in the neighborhood. The accompanying Illustration presents a Detroit electric hotel hus, and placed in service recently by the Hotel Brazos, Houston, Tex.

The vehicle provides seating capacity for 14 persons in addition to the driver and the feature of the body is the placing of a roomy luggage rack on the top. This not only does away with the blocking of the sisle, an annoyance to the occupants of the ear, but permits of carrying the baggage on the same trip. The rack is reached by means of a ladder

The windows of the machine are of French plate glass, arranged so as to be dropped in warm weather and equipped with an anti-rattling device. The interior is lighted by electricity and the chassis is suspended on well designed springs insuring easy riding qualities. The battery, which is incated amidships, consists of 60 A-6 Edison cells. Final drive is by side chains to wheels which are fitted with solid tires, 36 hy four inches. The front members are also single, solid, 34 by 3.3 inches. The speed of the automobile is 11 miles an hour. One of the features which attracts the attention at night is the use of an electrically illuminated sign on either side of the luggage rack.

Day Baker, New England manager of the General Vehicle Company, Long island City, N.Y., gave a stereopticon illustrated lecture before the New England

Foundrymen's Association at Boston recently. He showed a large number of pictures presenting the progress of the electric vehicle from 1886 to the present. Of particular interest were the illustrations of baggage and factory trucks, six of which have been installed in the North station at Boston. The devices for factory work are operated at a moderate speed and are capable of carrying a very heavy load. A form of carrier utilized by large beef desilers also was explained and illustrated

Realizing that the electric commercial and pleasure vehicle are entering upon a new era of prosperity and that the use of the former will be very largely increased throughout the country, the Westinghouse Electric & Manufacturing Company, Pittsburg, Penn, has mapped out an extensive campaign for the more general use of its electric motors for reblices of all kind. At present about 24 makers are using the Westinghouse motor as a standard equipment. The concern has made a supecialty of motors and controllers together with charging apparatus for batteries, for years, and it is the plan of the the company to give every prospective owner of an electricity expert advice on the different kinds of equipment. This exercise with the different company regardings exercise will also be given freely to garage men, trucking companies and manufacturers who desire the opinions of the consulting engineer.

Standard vehicle motors are made in different forms for commercial vehicles including everything from those employed in transporting baggage in rallroad terminals to the heavy duty types for trucks. The proper selection of a motor requires a careful study of a number of factors, of which the most important are: The character of the vehicie, its speed, the method of drive, and maximum weights when empty and loaded.



Detroit Electric Hotel 'Ban Which Wan Placed to Service by the Hotel Brazon, Houston, Tex., Recently...The Vehicle is Fitted with Electric Sign and Luggage Carrier on Ten.

The first electric commercial vehicle to be constructed in Youngstown, D., was completed recently by the Youngstown, Electrical Garage Company, the firm being composed of A. F. Clause and Fred McVan. The machine has a carrying capacity of 1000 pounds, is capable of attaining a speed of 15 miles an hour, and is said to obtain 65 miles on one charge of the batteries. The price of the new car has not as yet been deedled upon. Orders have been received for five machines and it is said the company will move that larger quarters.

After an experience of several years in designing, building and maintaining commercial vehicles, the Walker Vehicle Company, Chicago, III., bas brought out the Walker balance drive for which is claimed simplicity, reilability and efficiency, as well as the climination of

Dig Lead by Google

chains, shafts, etc. The power plant is all enclosed in the hollow rear axle and rear wheels and it is said this arrangement is not affected by load or road conditions, and



Fig. 1—Showing Compact Power Plant and Construction of Walker Halanced Drive.

that all moving parts are in perfect alignment, fully enclosed, dirt proof and very accessible.

A single motor is employed, this being housed in the rever axie, and power is transmitted through the directly of connected differential and the two drive shafts extending from sockets in the differential into sach rear wheel. Each shaft is equilipsed with a pinion at the wheel end and transmits the energy through idler gears to the large rim general fastened to the tire rims of the wheels as will be noted in Fig. 1. Two differential is directly connected to one end of the hollow armsuture shaft.

The operation is obvious. The motor and direct differential drive the shafts, the pinions of which impart ontion to the wheels by means of the idler and the rim gears. The drive plations and shafts have no bearings except the teeth of the idler gears between which the pinions float in a balanced manner, this making for durability. The motors are designed to meet the severest demands, and are said to be of ample capacity to perform the work continuously with the greatest efficiency. The boilow armature shaft runs in large imported Hess-High ball bearings. As will be noted, the motor, differential and drives shafts are all on the centre line of the axis and the power is developed on the centre of the axis and the power is developed on the centre of the axis and transmitted in balanced, outposted directions to each wheel.

The rear wheels are of special design, of ample diseneter, and enclose the driving mechanism. The sides are formed by two pressed steel discs with radial corrugations in the form of spakes, which, in combination with the dished shape of the discs make for great strength and durability. They are mounted on liess-lirght bail bearings of ample dimensions. The wheels are partly filled with lubricant, which is distributed over the working parts continuously when ranning and being oil tight prevent dust and dirt from entering as well as accumulating on the exterior. Drain plugs are fitted for the purpose of replenishing the supply or removal of old lubricant.

The disc type wheel is also utilized in front and these are mounted on Timken roller or Heas-Bright ball bearings. The front aide is a one-piece drop forging of I beam section type. The steering knuckles and front wheel stub asiles are integral drop forgings of nickel steel and the use of Timken roller bearings but only makes steering easy but reduces wear and neemits of adjustment.

On the standard design a triangular reach of channel section sied extende from the extremities of the front axie to the chassis frame where the two ends unite in a bail joint, this arrangement, which is depicted at Fig. 2 D, providing an extra bracing as well as absorbing road shocka, and the ball joint permits the axie to assume any angle which the road surface necessitates.

The Exide battery is furnished unless otherwise specified by the purchaser, and is located amidships, being supported by substantial steel cradies. It is accessible through a trap door, also side doors on either side of the container, this facilitating examination of cells.

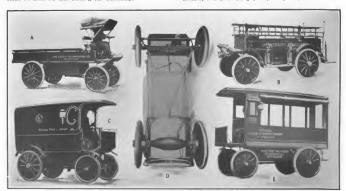


Fig. 2—Depicting Different Types of Hodies Fitted to Walker Balanced Drive Chassis: A. Flare Board Express; B. Combination Rose and Chemical Wagon; C. Panel Delivery; D. Showing Simplicity of Chassis Construction; E. Sereen Body.

Dig Loogle

Four speeds forward and one reverse are provided, all controlled by the left hand, while steering is by wheet or lever with driver at the left. Two pedals are employed, one for the brakes, the other controlling the reverse, which is operated through the controller. Option is given in the matter of attering, a binged horizontal hand lever or usual wheel being listed.

An ampere-hour meter is fitted to the dash in plain sight of the operator who may tell at a glane how much courrent has been consumed, the enabling the driver to current has been consequently the consequently of the consequent

The Walker vehicle is manufactured in normal load capactites ranging from 750 pounds to 2.5 tons, and the maximum speed varies from eight to 15 miles an hour. The hattery, body, loading space and wheelhase are optional to suit the requirement of the purchaser.

in his address before the members of the Electrical Vehicle Association of New York City, recently, Stephen G. Thompson brought out some pertinent facts recarding the infinence of the central power station on the use of electric commercial vehicles. In discussing the subject, "is Central Station Activity in the Electric Vehicle Justined." his general conclusions were that it is and that the electric is entering an increased field in commercial utility.

"It is estimated that 20,000 commercial machines are now in operation, and that within a year this number will be increased to 45,000 and in 1915, 200,000 will be in service, representing an investment of some 5-00,000,000,000, and Mr. Thompson. "The number of electric commercial cars is at present estimated to be 5:000 or which 10 per cent is employed in some 10 installations. This condition presents a new phase of the electric evolveles situation, and indicates a tendency on the part of the manufacturers to concentrate their efforts on a few customers and in the lancer cities, thereby neglecting the less thickly populated instruction.

"thy cultivating this field the gasoline commercial car makers have been able in the past few years to market 220 per cent. more machines than have the manufacturers of electrics since their first entry line the market, and we emphasized the popular belief that the electric automobile is fundamentally for use in the larger cities above.

"Of course, one may argue that in consideration of the number of gasoline vehicle makers, who outnumber the active electric commercial manufacturers in a ratio approximately 30 to one, the percentage of gasoline machines in excreas of electrics is no indication that the makers of the latter type have been remiss in their efforts. However, the truth must be recognized that it is due more to the energy of the salesmen and agents of the literial combination motor car than to any superiority of the machines themselves, that in a few years this type of automobile should dominate the market.

"If there be any truth in the oft reterated statement that the electric will represent 55 per cent, of the total number of commercial vehicles employed at the end of 1915, instead upon the present ratio, there should be 190, nose assoline cars, based upon the present ratio, there should be 130, one electric and 10, now gasoline; and it is this fart alone that justifies the central station in actively promoting the introduction of electric vehicles. There is no especially good reason why cities of 50,000 lababilitats or more should not present a fertilis field for the sale of the electric.

In competition with gasoline cars, in that such communities represent the hub of a husiness area whose road transportation is confined principally within the city limits, while the bulk of suburban delivery is well within the economic zone of operation of an electrically driven machine.

"That the central stations are fully alive to the situation is evidenced by their present activity, which needs but the equivalent co-operation on the part of the vehicle manufacturers to precipitate an unprecedented electric boom. Many of the obtacles which opposed the early introduction of electrics have been removed. Excessive charging rates are a thing of the past.

"While some manufacturers entertain the belief that the charging facilities should be supplied by the central station for each individual user, the contention might just as logically apply to the free installation of motors, (ans, etc. It would appear more rational to assume that the sale of a vehicle should include all accessories required for its proper care and overstion.

"That the central station co-operation is effectively increasing the number of electric is operation is manifested by the reports of the manufacturers themselves, who testify to an unprecedented demand for this type of machine, and that there is every indication that the central stations have more than performed their duty in nursing the electric vehicle industry to a state of healthful development.

"In Boston, New York City, Cleveland, Chicago, Detroit, Indianapoits, St. Louis, and many other localities, the increase in the number of electric vehicles has been quite marked; in some Instances reaching 300 per cent. The aggregate Increase is sufficient to warrant the belief that continued co-operation will produce a demand for electric machines far beyond the capacity of the present manufacturing facilities, and justify the prophecy that the time is not far distant when the general use of the electric vehicle may be expected to tax to the limit the existing central station installations."

Crossiey, Milner & Co., a large department attre of Hetroit, and Toledo, O., has adopted the electric vehicle, having placed an order with the Anderson Electric Car Gonphase, and the second of the Company of the Company with the company of the Company of the Company of the the equipped with special delivery hodes. The remaining automobiles will be of the Li-ton type, fitted with furniture bodies with carrying agaser 31 feet hough and six wide. Crossley, Milner & Co., made a careful and thorough investigation of the capabilities and possible service to be secured from various types of cars and decided upon the electric arter it had demonstrated successfully its ability to make runs to Grosse Point, Wayne and other suburbs, 12 to 15 miles distant from the heart of the city.

The Springfield, Mass., fire department is to have another electrically propelled ladder truck similar to the one stationed at the Court street headquarters, this step having been decided upon by the fire commissioners. The new apparatus will cost about \$10.000, it is stated, and will be installed in the new addition built recently to the Pine street station, affording better protection to that district, which has heretofore relied upon the horse drawn equipment. The new machine will be of the Couple-Gear representative type, made by the Comple-Gear Preight-Wheel Company, Grand Rapids, Mich.

The Edison Electric Illuminating Company, Boston, is planning one of the largest garages of the country for housing electric vehicles—it will be located on Commonwealth arenue, as a part of a large service plant.

Un Google

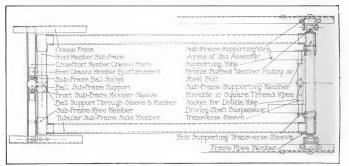
FOX SYSTEM OF POWER PLANT SUSPENSION.

Unit Motor Clutch and Transmission Assembly Protected from Chassis Frame Distortion, and Rear Axle and Shaft So Designed as to Be Relieved of Driving Stresses and Road Shocks.

By Joseph P. Fox.

WHILE a motor vehicle chassis may appear to be a perfectly solid assembly while at reat so far as the unity of its members is concerned, when in motion it is subjected to stresses proportionate to its velocity, the load carried and the condition of the surfaces over which it is driven. These stresses are resultant from the shocks primarily communicated through the tires and wheels, askes, springs and frame. As the wheels may move or rest in a different plane the influence from each wheel may be more or less, unitedly or differently directed. The result is that the chassis frame is constantly subjected to twisting or disployed to lessen the strains upon the motor or transmission cases, the bearings, gears and shafts, but as adapted by many the results have not been satisfactory. This has been due to the rigid installation of the motor or transmission in the chassis frame. Carrell consideration of the proposition must establish conclusively that there can be little difference in results experienced from either three or four point suspension if the points for suspension are broad and firmly secured to the chassis frame.

Supporting arms of sufficient strength to carry the weight would undoubtedly strain or distort the engine cas-



Plan View of the Tabular Sub-Frame Carried by Ball and Socker Bearing at the Front and by Silding Side Supports, Designed for the Fox Public Service Cab.

torting strains, which may be multiplied rapidly by the speed and road surfacing.

It is not practical to resist these atresses by heavier construction. It is essential to have light weight for many reasons. These facts have been long understood by engineers and manufacturers, who have sought to minimize the stresses by methods more or less productive of results. One design to receive material consideration has been the suspension of the power plant from three points, the purpose being to minimize the effect of the frame distortion which in turn is communicated to the engine case, the hearings and the shafts of the motor. Practical experience and theory have established the necessity of every moving part being in its precise relation to prevent the loss of power through excess motion or cramping of the mechanism. It is apparent that a very slight variation at a given point may be multiplied many times at another.

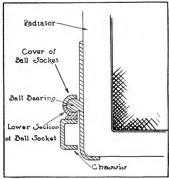
Then if this frame distortion cannot be prevented it must be compensated so far as possible. Three point suspension as applied by designers has many forms. It having been accepted as an engineering principle it has been en-

ing II immorably fixed. Then to obtain the precise result itself in the mean of an uperandon must not be rigidly face each, but must be so designed as to maintain a perfect relation of members no matter what the influence of operandon upon the chassis. That is to say, the mechanism to be preserved from the strains and stresses should have sorved from the strains and stresses should have an of the chassis of the chassis. That is to say, the mechanism to be preserved from the strains and stresses should have sorved from the strains are complish this may constructions have been adopted, some by leading manufacturers.

Dainter Truck Suspended.

An example is the latest Daimler truck, which has not only three point suspension for the motor, but for the transmission case as well. Both engine and transmission case have as one suspension point a large ball and socket, that for the motor being at the front of the case and for the transmission at the rear. Both motor and transmission cases have two swivelied bearings at the other ends. These swivelled suspension bearings are rigidly fixed, the purpose being to eliminate the twisting movement of the side members of the chassis upon the engline and transmission casings by the turning of the ball bearings in Chiefficol

sockets. The intention is to compensate for the rocking motion of the frame. While this construction will no doubt afford relief from some of the strains of the flat, sinking



The Ball and Socket Mount for the Hadiator That Eliminates
All Twisting Strain,

movement of the chassis, it would appear that the peculiar assembly of the suspension points, as well as their rigidity against any hending motion of the frame, would be ineffective to protect the power plant against twisting strains.

There are many different forms of three point suspension, or at lessa applications of the principle. Some of the manufacturers who have adopted it have not redesigned their chassis, but have designed a form that may appear to be best suited to meet the requirements in the cars they build. The construction of many power plants is not such as to make possible the use of a true three point suspension and such vehicles may have the name but not the quality the term implies.

Value of Three Point Support.

The writer is of the opinion that there is no feature of car design paramount to three point suspension, and helieves that the results obtainable are well worth the expense and trouble of reconstruction. But better still would be the designing and building of a power plant having all advantages of an actual or ideal three point suspension. This means that the power plant abould be of the unit type in which the motor, clutch, transmission and gear shifting levers are assembled in one casing, this assembly being suspended in the frame from three points. The assembly should be so constructed as to rock or glide in a manner that will protect it, even on the worst roads, from all bending or twisting strains of the frame. With such construction the main shafts of the motor and transmission are sure always to be in line, thus dispensing with the usual universal joint between the two shafts and relieving the shaft bearings of all nadue strains. When the engine and transmission are each suspended independent of the other in the frame of the car, even though each has a three point auspension, it is necessary to use a universal joint between them, so that in reality there is six, instead of three, point installation. The universal joint hetween the motor and the transmission at best but partly compensates for the

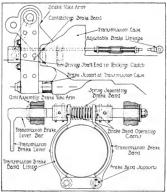
influences of the twisting frame. The shafts are not in true line when the frame is twisted and the universal joint is expected to prevent shafts springing and excessive wearing of bearings. Universal joints cause friction and loss of power, are often noisy, require care and attention, and, worst of all, because of irregular transmission of power, cause shocks that after in the ahafts and bearings, which theoretically ought to be free from friction. For the reasons stated the writer is of the opinion that the entire power plant should be suspended on three, not six, points. These conclusions were the reason for the design of the motor, clutch and transmission as shown in the description of the Fox cab.

Unit Power Plant Necessary.

This design has been worked out to have construction that will not be succeptible to the stresses upon the chansis, will maintain alignment of shafts and bearings, and compensate for any force that will create friction and result in lost power. To secure these results it has been found most practicable to me a tubular sub-Trame, the plan view of which is shown herewith. This has been shaped to carry the full assembly and relieve it of practically all stresses. This frame carries the entire power plant, which is supported at either side by a wide flange or we he stending from the front end to a point about the centre of the clutch bounting. Besides firmly anchoring the plant this flange so attengthens it that it cannot be disnorted by the greatest strain or shock it may be subjected to.

Sub-Frame in Fox Design.

By reference to the illustration the form of the subframe is shown, and into this frame is seated the engine, clutch and transmission assembly. The frame is of suitable tubing. The power plant is bolted to the sub-frame, the rear end of the plant is carried on the arms of a yoke supported by a bar which is parallel to the rear member of the



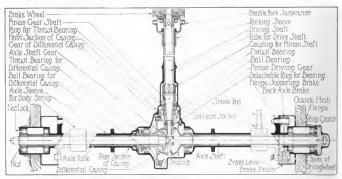
Plan of Construction of the Transmission Service Brake and

sub-frame. The side flange serves as a drip pan and protects the motor from water, mud, dust and road accumulation, quite as well as a sheet of metsi. A sleeve is fitted to the centre of the front sub-frame member which is the support for a buil shaped bearing. This bearing is supported by a bull seeket centred on the top of the front member of the chassis frame. The upper half of the seeket is fastened to the lower by bolts and nots. By removing the nots and the upper half of the seeket the forward end of the sub-frame may be raised, the rear supports being designed to serring this moveman.

The rear supporting members E are screwed easily into the kneen at the ends of the rear member of the sub-frames by square cut threads, which permit an easy rocking movement in the event of the chasis frame visiting, or should the forward end of the power plant and sub-frame be lifted. The outer ends of the supporting members are bored and bushed with bronze and these hushings are secured by boltate to yokes having flanges riveted to the upper and lowersides of the channel section chassis frame side members. These supporting members have a longitudinal movement on the bolts. Obviously the movement of the chassis frame is least in the center and greatest at the ends. Should ing strain. This relieves the motor shafts and bearings from all stresses and, strengthened by the supporting web. the engine case cannot sag. The section of the motor assembly back of the crankcase, containing the flywheel and the transmission, is also rigidly held by this construction, and yet any movement of the shafts is perfectly compensated. By making further reference to the sketch, it will be seen that the rear sub-frame member carries near the outer ends two firmly fixed sleeves, to which are fitted lugs. These lugs are bored and through them, paralleling the rear sub-frame member, is a transverse har that may turn on the holts that retain and support it in the sub-frame. From this bar is suspended a yoke that may move backward or forward by the swing of the bar or from side to side, this in effect being a universal joint. Into this yoke is bolted the yoke of the tuhular driving shaft housing. affording a substantial but flexible suspension.

Transmission Brake Support,

The rear end of the motor assembly case carries arms



Plan View of the Driving Shaft and Rear Axle Assembly for the Fox Cab, This Showing the Helaforcement of the Sectional Axle Hausing, the Strong Wheel Bearings, and the Menns for Compensating Hand Shock Stresses.

there be any lifting or twisting motion of the frame sides the sub-frame will rock on the ball and mocket bearing. Should there be forward or backward motion the sub-frame side supports will side correspondingly on the supporting boils. There will be no stress upon the shafts or bearings.

Time Economy a Large Factor.

This form of suspension millimilizes the libbor of assembling a power plant, a matter of decided importance with cab owners, for spare power plants may he used and the chassis kept in operation in the event of engine defect or failure. With proper facilities and skilled workers the plant may be removed and replaced by another in an hour. Under the conditions usually existing today such a change would require from one to two days and perhaps longer. As may be noted, It is only necessary to remove the upper half of the hall and socket support to free the sub-frame so that It may be raised.

As the motor is firm in the sub-frame, and the aub-frame has such suspension at the rear that it may more slightly in a longitudinal direction, and it may rock or swing at the forward bearing, it will be seen that it is free from all twistfor the suspension of the transmission brake band, which is the contracting type, the brake lever and the supporting rod. By following the driving system through from the engine crankshaft it will be seen that the crankshaft rear extension carries the flywheel and the movable clutch member. The cone of the clutch is on a sleeve that engages with a clutching member carried on the end of the driving shaft of the transmission. This shaft is coupled to the continuation of the transmission driving shaft. On this continuation of the transmission driving shaft is mounted the transmission brake wheel or drum. Attached to the brake wheel is a rocking clutch, so-called, in which the forward end of the driving shaft is socketed. This rocking clutch permits movement of shaft in all directions without causing a strain. This driving shaft is carried in its tubular housing held by the yoke suspended from the rear of the sub-frame. As the shaft is free to move longitudinally in a supared sleeve at the rear end there is a slight telescoping movement which compensates for the motion of the rear axle. It will be seen that there is no strain upon the shaft as the chassis frame rises or falls upon the springs.

or when there is a twist of the frame. There is no thrust upon the shafts or the bearings at any time.

Considering the construction it will be seen that while the motor is held in the sub-frame and protected by this suspension from any atrains or stresses, this same aubframe carries the forward end of the divising shaft housing and, as there is allowance for movement of the chassis frame, the sub-frame and the shafts, there can be none of the stresses and but a small degree of wear as compared with a design in which all of these elements are rigid. It will be apparent that with imperfect suspension but little movement may cause bearings to be jammed, shafts to be bound so as to cause excessive friction, greats to be thrown from the precise relation necessary for efficiency, and other conditions precipitated that will cause lost power and destructive ware.

Driving System Protected.

Examination of the entire driving mechanism of the cab will demonstrate that the elimination of shocks and stresses has been carefully studied. Beginning with the clintch and concluding with the contact of the traction whereis npon the road it will be understood that there has been endeavor to have an elisatic construction that will have every desirable quality. Considerable emphasis has been made upon the three point suspension of the sub-frame and

the power plant, but it is also apparent that the driving shaft and the rear axie construction are given material protection through the yoked connection of the forward end of the driving shaft housing, which will yield slightly to compensate any straining movement, and the freedom of the semi-eliiptic springs to move and cushion the road shocks. With the full floating type rear axie the axle housing austains all the weight and the axle shafts and differential are protected against every influence so far as this may he done

In explanation of the driving aystem it may be pointed out that the engine crankshaft, carried on five bail bearings,

is aiways free from stresses. On the rear end of the crankshaft is carried the flywheel and this is very close to the rear main bearing to prevent vibration. The shaft is tapered and the flywheel is keyed on it and further retained by a tocking nut held by a pin and a locking spring. Into the hollow end of the crankshaft is screwed a shaft extension or spigot which is also retained by the pin and locking spring. Surrounding the spigot is the clutch spring which is compressed and normally holds the cluich engaged by expansion. Back of the spring is a collar and then a bail bearing, and next is the adjustable collar by which the clutch spring tension is established. The flywheel is with the face divided, the inner face of the rear ring or section of the wheel being machined to the same angle as the clutching member. The flywheel is of cast iron, the clutch cone member of aluminum.

Flywheel and Clutch Assembly.

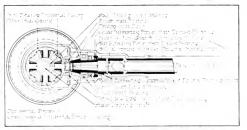
The flywheel sections are held by boils so that normally the clutch come contacts with the internal angular face. The clutch cone is mounted on a sleeve carried on the apigot on which it has a longitudinal movement. On the cone sleeve ia a ball bearing for the fork of the clutch lever. This bearing is assembled with a member that carries the three plan of the shaft clutch. As the clutch apring is com-

pressed the clutch is disengaged, it sliding forward on the spligot. As the clutch pedal is released the spring throws the cone backward into contact with the beveiled inner surface of the flywheel. At the rear of the transmission case in the clutch uniting the transmission driving shaft sections, and back of this late rocking clutch that is carried at the rear of the transmission brake draw, in which is mounted the forward end of the main driving shaft.

This internal cone clutch is designed to be adjusted with a minimum of labor. It is wholly encased with the flywheel in an oil and dust tight compartment and it is free from the usual influences for wear. It is perfectly instricted and it cannot be subject to the usual causes of clutch trouble. The clutch design is conductive to a minimizing of the oscillatory movement of the crankshaff of the motor and engagement can be made without perceptible far or joil.

Clutch Removal Quickly Done,

The clutch may be removed from the case by removing the upper case section, the operation being comparatively easy. By removing the boils retaining the flywheel sections, the locking spring, the pin and the locking nut and the coupling members of the clutch, and then holding the clutch cone and the spigot in relation by means of a special wrench; the snigot may be backed out of its socket in



that the engine crankshaft, Sectional View of the Differential Assembly. Hisstrating the Briving and Platon Shafts carried on the best loss than the Engaging with a Sleeve in Which Either Has Telescopic Vetton,

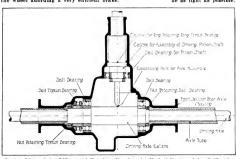
the end of the crankshaft. This being done the clutch cone, spice, and the detachable half of the flywhed face may be lifted from the case. This form of construction simplifies any work that may be necessary on the clutch. Every member may be removed and cone refaced or any part restored without affecting the other groups of the assembly. This is a condition that may be well appreciated by those who have to do with automobile maintenance. The lifting of the footboards and the removal of the upper section of the clutch case gives fullest access for any repair, while there is a large handhole for inspection.

There is conventional construction of the transmission gearest, which has been briefly described. This has the four forward ratios and reverse and the countershaft parallels the main shaft at the side. To secure rigidity of the assembly this end of the case is strengthened by brideing and the overlap of the section joints of the case, which, it will be understood by those who have noted this design, are large and strong. The transmission case is in three parts, the lower, which carries the shafts, gears and bearings, the upper, and the impertion hole cover. That the lubricant with which the case is filled may not enter into the flywheel and the clutch section of the case there is a stuffing box in front of the forward bearing, and a drain frong the bearing cooled.

carries all excess grease or oil back into the base of the transmission case.

No Strains from Driving System.

This section of the case is subjected to no driving strains whatever, for the flange supporting the power plant assembly extends from the front to a point midway of the ciutch compartment. The ciutch lever is mounted at the base of the case and there is no transverse strain from its movement. The transmission brake is similarly operated, but the brake wheel is carried on the shaft directly in front of the double yoke supporting the forward end of the main driving shaft, and the rocking clutch at the rear of this wheel prevents any stress whatever upon the shafts. The arms at the extreme rear end of the assembly carry the brake hand for the transmission or service brake. This brake band is of the contracting type with the ends carried on a bar. It is jointed at the centre below the hrake wheel and is lined with soft iron. The ends of the brake hand are normally kept separated by a spring. At either side of the brake band ends are collars having cams contacting with the band, so that when the supporting bar is turned slightly the cams contact the band tightly about the wheel affording a very efficient brake.



Section View of the Differential Housing, Shawing the Method Employed for Calibrating the Genz Assembly to Secure Accuracy and Interchangeability.

Considering this construction for a moment it will be understood that there is no connection of the power plant through brake or clutch levers with the chassis frame. The control levers are mounted on the motor assembly and with the left side drive the driver has right hand jevers which are in every way independent of the usual connections. Any twisting stress is avoided and the moving parts are free from influences that might cause excessive wear or friction, while accessibility is always pre-eminent. in fact this characteristic is extended to the cooling system. The radiator is regarded as being especially susceptible to the chassis frame stresses and to protect this the frame in which it is mounted is supported by two hall and socket bearings so that any movement is compensated and the radiator is never strained. The radiator may move independently of the motor because of the flexible connection of the water manifolds, and there is a swivelied rod extending from the dash to the radiator frame to maintain its relation without rigidity.

Three Point Rear Axle Suspension.

The rear construction, comprising the propeller shaft, differential, rear axic, driving shafts, wheels and brakes,

has been designed with especial care to meet all of the conditions to which it will be subjected in the usual service of a public cab. There is no part of the mechanism of a chassis on which more time and money is expended than the driving wheels and shafts and it is essential that these be not only enduring but of such form that they can be easily maintained. That the rear axle is oftentimes so expensive is not an occasion for wonder when the heavy work it is constantly subjected to, the design, material and workmanship are considered. Other groups of the assembly are protected by three point suspension, elastic springs and shock absorbers from strains, twists and ahocks, but the rear axie is carried directly on the rear wheels and must bear every stress from contact with road obstruction. The greater the speed the more severe the impact. There is absolutely no protection except in reduction of movement, which is precisely what is not wanted by those who desire cab service.

Every detail of design, construction and assembly, as well as the selection of parts and material, must be given the greatest care. The purpose is to obtain what will in every way endure, bave ample margin of strength and yet he as light as possible. With only the tires to absorb the

With only the tires to absorb the shocks it is evident that the one object is to escape every influence for deterioration and weakness. For these reasons I am not favorable to incorporating the apeed-changing gear with the rear axie assembly. Not only would this increase the unsprung weight but would also subject this mechanism to greater wear. sides this the weight is added to by the rods and levers necessary for operation, which must also wear, and there is always more noise as the service of the car is extended.

Advantages of This Design.

The rear axie construction may be likened, indeed, it may be classified, with three point suspension in that two points are supported by the wheels, while the connection of the forward end of

as the third. It is evident that every advantage should be gained from this so that an easy, rocking or awinging movement of the rear axie should be made possible by the construction and suspension of the shaft. This movement, once provided for, should not be restrained by other parts more than is necessary and consistent with the proper support of the vehicle.

It is necessary to assemble in such a construction, and within the centre of the rear sale, the differential gears, driving and sale gears, the shafts and bearings. To obtain good results the gears must be in perfect mesh and the shafts in perfect line If a quiet, frictioniess and economical transmission of power is to be realized.

To accomplish this it is necessary to suspend the centre of the rear axie, where there is always a heavy strain, so as to protect the gears, shafts and bearings from the weight of the vehicle, as well as the other destructive influences. Of these the driving strain of the shaft pinion and the use of the brakes are by no means least. These purposes are best served by the use of a full floating axie, which has keen adopted in the design of this cab.

March, 1912.

Full Floating Rear Axie Drive,

By reference to sketch it will be seen that the frame or axle casing carries the full weight of the rear of the car, thus allowing the axies to be assembled at full float. That is, in such manner that they will be only subjected to the turning strains necessary for the transmission of power to the driving wheels, but never to the bending strains which the axies are required to sustain when the driving wheels are attached to their ends. With the semifloating type the shocks received by the driving wheels are transmitted to the differential drive shaft, gears and bearings, naturally affecting all of them to a greater or less extent. With excessive wear comes greater friction, noise and eventually destruction. A bent axie shaft is not an unusual condition experienced with vehicles of such axle

ily further reference to the drawing it will be noted that the housing for the drive shaft is suspended from a point directly above the rocking clutch incorporated with the transmission brake by a double yoke and sleeve that permits the axle housing a free rocking movement in all directions. This suspension point is the transverse bar that parallels the rear sub-frame member. If there he any change of the rear axie with relation to the line of the engine and transmission shafts, the shaft housing always is free and clear of any strains that might bind hearings or gears or cause undue friction. The rocking clutch and the double yoke establishes the entire driving construction back of them to be an another group, practically separate and apart. This design largely eliminates the leverage pressure of the driving shaft and the heavy reactionary pressure on this shaft when the hrake is applied. It relieves the shaft from all strains save those necessary for the transmission of power. It will be noted that the driving shaft is really in two sections, the shaft itself and the pinion shaft to which the driving pinion is fixed. The rear end of the driving shaft and the forward end of the pinion shaft are squared and these ends are fitted into a sleeve in which either may move longitudinally, a spring separating them slightly and maintaining a relation so that there is no thrust whatever upon the bevel gear, the plnion, the rocking shaft, transmission brake wheel or the transmission shaft extension. The forward end of the driving shaft in the rocking clutch has a ball head so that there can be no strain upon the bushings. The relation of the rear axie and the frame are maintained by two radius rods or shove bars having ball and socket connections at the axie which do not restrain the movement of the axie in any other direc-These rods relieve the springs from the strains of propelling the car and prevent a swinging motion of the body on rough roads,

Axle Housing in Four Sections.

The rear axie housing is in four sections, these being the central section which contains the differential and the bevel gear, divided vertically on a line paralleling the axle, and the two end members. Referring to sketch it will be noted that the axie sections are bolted together by flanges well outside the centre line of the differential. The ends of the end sections of the housing carry the heavy flanges on which are installed the shoes and the rods actuating the internal expanding brake. Through the axle housing from either end to the differential bearings extend heavy steel tubes which reinforce the construction and project beyond the flanges at the housing ends. On the ends of this tubing are the double hall bearings on which the wheels are mounted. The design is such that the axle housing joints will sustain many times the weight or strain they have to bear without being deflected from the true lines.

The differential assembly consists of four pinions and two gears, the whole carrying the hevel or driving gear of the rear axie. The driving gear is at the left side. At this side is both a ball thrust and a ball bearing, and at the right is a ball bearing, on which the differential assembly revolves. The axie driving shafts at the outer ends are fitted with clutch plates which mesh with clutch rings fixed at the outside of the hubs of the rear wheels so that the wheels are constantly retained. The jeverage pressure upon the driving and pinlon shafts is eliminated by the two ball bearings to be noted, the one in front of the pinion gear on a detachable ring and the other just behind this gear, supported by the driving shaft extension of the axie casing.

Ball Bearings for Moving Members,

Throughout the rear axle construction five ball bearings are used and there are two hall bearings in each of the wheel hubs, set well apart to secure steadiness and smoothness of wheel movement. The shafts and gears of the driving system are made from chrome nickel steel, this insuring the greatest strength and lightness. The driving shaft is suspended in the chassis so that when the vehicle is loaded the drive is practically in a straight line, this permitting the utilization of nearly all the power developed by the motor. The driving and axle shafts and the differential are operated in an oil bath, which affords the fullest quality of lubricity.

it is well known that with the full floating type of axle construction the application of a balanced brake does not load or strain the shafts and gears. In fact such brake gives the best service and is the most economical in its wear upon the transmission system. It is for this reason that I have designed the wheel brake for constant service. to be operated by the pedal, and the emergency brake on the transmission to be actuated by the hand lever. The importance of this assembly is not to be under-estimated, for the pedal is the quickest to operate, is the most convenient and will be used by the driver in practically every case in preference to the hand lever.

it will be seen by observation of the details described that the power plant and driving mechanism of the cab have been designed with the purpose to escape so far as this is possible all conditions that may cause unnecessary wear and deterioration. The assemblies have been made oil tight and dust proof and protected against all accumulations of abrasive substances. The flexibility of the constructions throughout has been sought with a view to insure against every condition that might cause wear. The lubrication has been studied with a knowledge of the need of a sufficient supply at all times. The utilization of the power has been made with the smallest motor that would serve all requirements. The materials chosen have been the best and the workmanship necessary in the production of the parts is to secure standardization and interchangeability. The mechanism may be inspected, adjusted and restored with the least labor and consequently little loss of time and service. The cab is intended for long and continuous work that may be required under average conditions, and hecause of undoubted economy from the viewpoint of the operating company and the satisfaction to be obtained by the patrons, the design appears to the writer to have much to recommend it.

TURNTABLE MEETS WITH FAVOR.

Turntables are invaluable in garages, and the Portland Garage Company, Portland, Me., which produces these devices is the recipient of many testimonials from leading garages and factory branches praising its appliance. The company constructed a special table for a manufacturer who company constructed a special control of the shows.

TO TEST SAMPSON ARMY WAGON.

Although it has been stated that the government intends to replace the army mule with the automobile, nothing has been done as yet in an official nature toward buying or ordering in large quantities.

The purchasing thus far has been confined to a few cars, and these have been ordered by the quartermaster's department. One of these contracts was placed with the Aiden Sampson Manufacturing Company, Detroit, a constituent of the United States Motor Company, New York City, and the machine which is depicted in the accompanying illustration, was built under special requirements and specifications furplaced by the government

From the standpoint of army practise in field equipment, this truck is not unusual although its features are interesting in that they differ from what is standard practise with makers of commercial vehicles. For example, the wheels of the Samuson are 42 inches in diameter, both front and rear, this size being necessary to give the clearance required in cross country work.

As the mule drawn equipment has to ford streams, travel



Sampson Army Power Wagon Constructed for Quartermaster's Department, Which Is Undecretor Trial In Texas.

through open fields and run over stones, etc., the government requires that the successor to the old method shall be equipped to do this work. To haut the car out of mid holes or places where traction cannot be secured, the wheels are constructed so that winch heads may be attached by means of simple book boits. The rope is fastened to some fixed object and a few turns taken around the winch heads. The slipping of the wheels winds the ropes, drawing the car from its position. The driving chains are enclosed in sheet metal casings, these serving to keep out the dirt and mud as well as distance and torque rods.

The seat is built over the engine, a practise characteristic of the Sampson 3000-pound capacity wagon. The inside body dimensions are nine feet by 43 inches wide. It is equipped with flare boards on side and a tall gate of height equal to that of the side members. These are heavily reinforced with Iron and chained. Conforming to army practise the carrying receptacle is fitted with removable bows and a canvas covering.

It is interesting to note that the government specifies a maximum speed of nine miles an hour. The normal speed of the motor is 1000 revolutions a minute and the engine is restricted by a governor. A specially low gear is fitted. Another notable feature is the tread. This is 60 inches which suggests that a wide range of service is anticipated. The wheelhase is 110 inches and the vehicle is designed to carry a load from 2500 to 3000 pounds.

The motor is a four-cycle, four-cylinder, water-cooled unit, having a four-lnch bore and five-inch stroke. It is mounted on a pressed steel frame, 4.5 inches deep, and the flanges are tapered from four inches wide in the centre to two inches at the ends. The front axie is a standard forged I beam section steel member while the rear is 2.5 inches senare with hubs having roller bearings. A multiple disc clutch and a three speed transmission is fitted, and a double set of brakes, these being of the internal expanding type and practically self wrapping in either direction. The automobile was sent to the Mexican border recently.

MOTOR TRUCK STANDARDIZATION.

At a recent meeting of the special committee appointed by the Society of Automobile Engineers to consider the

course of action to pursue in fur-

thering the work of standardizing mechanical transports it was decided that it was desirable to attempt to standardize the sizes and capacities of trucks from the purchaser's or user's standpoint, and afterwards to extend the work in the direction of aiding the manufacturers in standardising design.

The pert proceeding was to determine the specification of normal load and the overload of machines from one to five tons and it was generally decided to vote that each car should be capable of rendering normal or continuous service under its tonnage rating and have an overload capacity for temporary or emergency service of 25 per cent, of its normal tonnage capacity.

Next an attempt was made to determine the desirable speeds for various sizes and by a process of voting the following was arrived

at: For one-ton trucks, 15 miles an hour; two-ton, 12; three-ton, 10; four-ton, plne; five-ton, eight. These determinations may be modified later, however,

Considerable discussion took place as to what the determining factors for capacity should be and it was agreed that the committee would take under consideration in this connection horsepower expressed in the dimensions and speed of the motor, as well as in draw har pull of the truck in completed condition.

it was determined that the committee should write to the manufacturers of axies for both motor trucks and horse vehicles and enquire their present practise insofar as dimensions relate to load carrying capacity. It was also determined to secure the specifications of machines now manufactured and at a ilttle later date request the recommendailons of manufacturers as to what their judgment would be in the matter of critical specifications on various truck sizes insofar as they relate to axies and their essential elements.

This subject is one which has an interest for manufacturer and user alike, in that with proper standardization the purchaser will be able to judge better the respective merits of the machines offered for his inspection.

223

foreign truck notes of interest

KNIGHT ENGINE FOR DAIMLER TRUCKS.

While the Knight sleeve engine has been used with the spiedule success in a number of pleasure care abroad and in this country, it has made little progress in the commercial which field. The first models thus equipped are an nounced from the factory of the Daimler Company, Ltd., Coventry, England, these comprising. One-fon delivery wagon, two and three-ton trucks, 10 horsepower omnibus, and the barbard to the first hard 100 horsepower agricultural tractor. In addition to the Knight engine these cars are fitted with the worm drive.

The motor in the one-ton vehicle has a bore of 90 mm and stroke of 110 mm, and is rated at 27 hors-power at 1200 revolutions. The cylinders are cast in pairs. Lubrication is by plunger pump, which delivers oil to troughs beneath the connecting rod big ends. Ignition is by Booch high-tension magneto, as is true of all the models. A leather faced cone clutch in employed. The transmission is of the selective sliding gear type, giving three speeds forward and reverse.

The worm and worm wheel are carried inside a cast steel housing to which are attached the hollow forged fingned steel axile tubes. A large cover is fitted over the top, and this supports the worm and wheel as well as the differential gear. It is possible, by removing this cover, to take out the whole of the gearing.

Two sets of brakes are provided, both acting on the rear wheel drums. The frame is of asb, reinforced by nickel steel plates, and the cross members are of similar construction. The wheels are hollow steel castings, mounted on bail bearings.

The same description will apply to the two-ton model. The three and five-ton vehicles and omnibus are fitted with an engine of 40 horse-power, the bore being 110 mm and the stroke 150.

The tractor's motor has a bore and stroke of 150 mm, which is started by a three horsepower aircooled entitie, located on the footboard beside the driver. This auxiliary motor drives a belt fatched to a pulley on the rear end of a shaft which runs forward to a small disc wheel, encacing with a groove on the flywheel of the main power plant. The worm, which is of ample proportions, it located directly over the axle, and the drive is taken from its cross start by means of pinions, which are forared wetterlathy over the final spur rings botted to the road wheels, the latter being standardized at eight feet in diameter. It is claimed for this tractor that it can pull 14 to 21 disc plows, cutting a furrow up to eight inches in depth. Actual tests are said to have demonstrated that it can turn over 3.75 acres an hour on a gashine consumption of 11 noits an arce.

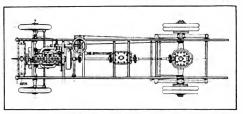
STREET CLEANING IN PARIS.

The monicipality of Paris, France, is experimenting with

four types of motor driven street cleaning machines. These include a straight sweeper, sweeper with spraying jet to prevent dust, combined sweeper and watering cart and watering carts with large capacity for washing streets.

The first named types are supplied by Louis Renault and Sautter-Harlet & Co. The former maker utilizes the standard twin-cylinder motor of 80 mm bore and 120 mm stroke as employed on taxicabs. The Sautter-Harle machine is driven by an engine having 90 mm bore and 140 mm stroke. With the latter the brush is driven by means of side chains, operated from a countershaft, engaging with a pinlon within the differential housing. On being raised the brush is declutched automatically, and provision also is made for regulating its height as wear of the bristies takes place.

The aweeper and sprinkler is furnished by the De Dion-Bonton Company, and is distinctive by reason of the facthat the brush is located under the centre of the vehicle. The fan-shaped aprinkler is just abead of the brush. The combined aweeper and watering cart is produced by the Laffly concern. A 77-gallon water tank permits the strength



General Arrangement of the New English Duimier Truck Chassis, Equipped with English Sicere Unive Motor and Worm Drive,

to be thoroughly watered before the brush rolls over it. Still another combination vehicle is the front driven Lattl, which is equipped to flush the street with water for washing immediately after the brush has passed over it. Two water pumps of low capacity are utilized for watering only, while a third with much larger capacity is used for washing.

POSSIBILITIES IN MALAY PENINSULA.

Good opportanities for establishing motor truck flues, possibly with a tractor and traffer combination, are said to be found in the Pederated Malay States. One instance is cited in the vicinity of Kaula Lumpur, the centre of the planting country. The 39 miles of road between that town and Port Sectionahm is in excellent condition and tags the fertile valley of the Klaing. The present railway like is said to offer very unsatisfactory service, and the zerowth of the export business through Port Sactionham has been such as to compel the producers to seek some means of relief. Motor trucks would be able to cover the distance in a

The same thing holds true in Singapore, where the

by Lidby Google

transportation of goods from the wharves to the business houses is in the hands of two companies, one of which has begun the use of motor vehicles and with excellent success. Among the more recent ventures may be mentloned the establishment of a motor passenger and freight service between Kuching and several of the adjacent towns. A two-ton truck has been ordered from England, the promotor being Tan Boon Siew, manager of a local Chinese firm,

MODELS PRESENTED AT BRUSSELS SHOW.

Inasmuch as there has been a decidedly increased interest in commercial vehicles in Belgium, following important improvement in the highways subsequent to the international road congress of 1909, it is anticipated that this country will offer a splendid market for industrial transports during the coming year. The recent automobile and aeriai craft exhibit in Brussels, demonstrated that local capital is taking advantage of the outlook, as no less than four new Belgian motor truck manufacturers were represented with vehicles of various capacities.



Delnhaye Five-Ton Brewery Vehicle, Fitted with Electric Hointing and Travelling Device Displayed at Recent Brussels Show,

Albert Bory of Brussels, regarded as the first commer-satisfactory tests and is held to be thoroughly practical. cial vehicle constructor in Belgium, presented a 3.5-ton chassis, which has been adopted by the Belgian army, and two light delivery wagons. Robinson & Co. of Antwerp showed a new electric vehicle, in which each front wheel is driven by a five horsepower motor. The Auto-Mixte Company of Liege displayed a tractor and trailer, comprising a six-wheeled train, in the rear compartment of which a flying machine was packed away as if ready for shipment. The Preudh'homme-Prion Works of Huy exhibited a sixton truck, a duplicate of those ordered from this concern for the Russian government.

Among the more important exhibits of older firms was that of the Delahaye, which was represented by 3.5 and five-ton models. The first was of the subvention type, with 24 horsepower motor of 80 mm bore and 140 mm stroke. The five-ton vehicle was designed for brewer's use, aithough of course it might be employed similarly in other lines. The engine is rated at 32 horsepower, having a bore of 100 mm and stroke of 160 mm. The driving wheels are fitted with

solid tires, in which steel study are imbedded. The distingulahing feature is the electric hoisting and travelling gear, supplied with power from a small dynamo driven from the engine. The accompanying illustration brings out this feature.

SCOTLAND'S COMMERCIAL CAR EXHIBIT.

The annual show of the Scottish Automobile Club, which was held this year in Glasgow instead of Edinburgh, did not reveal any large number of new features, having in mind the display at the Olympia show earlier in the season. Some very splendid body designs were shown, particularly with respect to so-called municipal service wagons and ambulances. In the matter of construction, the worm drive appears to have been extended slightly.

Only one American car was seen, the White, made by the White Company, Cleveland, O. This was shown in the three and five-ton sizes. One other model is of apecial interest to Americans, Inasmuch as It is made under Ilcense in this country. This is the Commer, which was

shown by Commercial Cars, Ltd it displayed the three and five-ton trucks, ambuiance and two 'buses, One of the latter was fitted with a worm drive

The Dennis concern, which supplies a large number of Britlah cities with their fire apparatus, showed a new gasoline driven pumping engine, capable of throwing 500 gallons of water a minute. This company also displayed a three-ton vehicle fitted with a worm drive and other features characteristic of the Dennis make.

One of the most interesting exhibits was that of D. Stewart & Co., with the Stewart-Thornveroft steam vehicle rated at five tons. No change was noted in the boller equipment, but the road wheels are now of the Reid-Ricke spring patent. These latter are of steel. Between the steel felloe and the outside steel tire are located some 25 colled springs, so disposed as to take up all road shocks. wheel has been given a number of

GRAMM TRUCKS IN RUSSIA.

What is claimed to be the first American truck purchased by the Russian government is a Gramm, made by the Gramm Motor Car Company, Lima, O. The vehicle was shipped to St. Petersburg last September for demonstration purposes, and has been in the service of the War Department for the past two months without repairs.

MOTOR TRANSPORTS IN SOUTH AFRICA.

Recent advices from Cape Town In South Africa indicate that there is to be a large increase in the number of motor trucks in use in that section during the coming season. While many of the country roads are not especially good, it is understood that considerable improvement has been made in the Transvaal, and that merchants in Johanneshurg and Pretoria are in the market for many cars.

FIRE DEPARTMENT NOTES



luring a recent big fire in Richmond, Va., the superfority of the modern free equipment was demonstrated in a striking manner. Recently, Chief Joynes placed in service a striking manner. Recently, Chief Joynes placed in service as Knos pumping striking manner. Recently, Chief Joynes placed in service as pany, Springfield, Mass. For 13 hours this machine kept and two streams of water going on the fire, practically without in intermission, and within a few minutes after it returned to beadquartes it was ready for another can.

HOLTO PRINTA DE LA RESTO DA MARCA ESTA DE TRADA VIGUA DE LA CALENDA DE CALENDA DE CALENDA DE CALENDA DE CALENDA

The alarm was rung in shortly before 6 in the evening, and it was not until 7 the next morning that the ready was sounded. During all this time the chauffeur, who siso sects as engineer and meethanician, occasionally poured abucket of gasoline into the tank and went over the mechanism with an oil can.

The steam fire engines at work during the same period each required two men, an engineer and a fireman. Their total consumption of fuel is said to have been over 25 tons of steam coal. The bill for running the gasoline pumping engine at full speed for the 13 hours was just \$4.50.

This big Knox engine really is an entire fire department in itself. It is propelled by the same motor that works the pumps, a six-cylinder, 66 horsepower until. It also carries a 3x-gailon chemical tank with hose and 1000 feet of water how. When not in action it has no horse to feed and its cost of maintenance between fires is practically nothing. In addition, it may be stated that it does not require horse wagons to supply it constantly with fuel when working at fire.

An accompanying illustration presents a hook and ladder truck recently supplied to the fire department in ladianapolis, Ind., by the Mals Motor Truck Company of that city. A particular feature of the equipment is the tires, add to be the largost ever manufactured. These are 28 by eight inches in size and made by the United States Tire Company, New York City, upon special order for the Mals

The vehicle was placed in such service that it was essential to have more than ordinary speed possibilities, even for this work, and the truck was designed to obtain 40 to 50 miles an hour without difficulty. In order to accomplish this, the weight is carried very low, and while there are nearly along the tof ladders on the wagon, they are nested so closely together that the highest point of the cutifiement does not measure more than fay feet from the ground.

The city of Paterson, N. J., has been progressive enough to purchase two motor driven chemical engines, and these have just been placed in service. The vehicles were made by the Alden Sampson Manufacturing Company, Detroit, a constituent of the United States Motor Company, which placed the order. All of the paraphernalis which is a part of the chemical equipment has been placed in a convenient manner on these trucks, so that quick action is possibly when it is necessary for the vehicles to arrive at the scene of the fire.

Alderman James L. Harrop of Worcester, Mass, chairman of the joint sanding committee on fire department of the city council, has been in conference with Mayor David P. O'Connell, relative to the purchase of additional motor driven fire fighting appearatus. The mayor is very much in favor of automobile equipment, and took the matter up exhaustively in his linuxgural message. The plan contemplates the replacement of horse drawn combination chemical and hose wagons at two stations with the modern equipment.

J. W. Cristic, who is more or less well known in the isludiary because of his advocacy of the front drive, has brought out a two-wheeled tractor embodying features of this design, for use in hauling steam fire engines. The new vehicle was demonstrated recently in Washington, D. C., Iloobeck and Paterson, J., and New York City, by C. J. Cross of C. J. Cross & Co., who it is understood will market the product.

A special committee on better protection of property, appointed by the town of Wakefield, Mass., will place an order in the immediate future for a moor driven combination chemical and hose wagon. The committee has \$5800 at its disnosal

Many southern citles have been adopting motor driven fire apparatus, to the total exclusion of the borse drawn equipment within the past year. Macon, Ga., is one of the municipalities which gave the plan a trial about a year ago. The remarkable success resulting is best exemplified by the following resolution recently passed by the city council:

"Whereas, the auto apparatus now in use in the fire department has clearly demonstrated its advantages of the horse drawn apparatus, from the viewpoint of lessening acexpense of maintenance and increase in efficiency, and the use of much less apparatus is approved by the Southwestern Tariff Association; and



"Whereas, the committee on fire department, after careing investigation, is consisted that the city can effect a further saving from \$800 to \$800 a year by amplianting the horse drawn apparatus with the motor driven apparatus, besides greatly increasing the efficiency of the department;

"Resolved, That the committee on fire department be, and it is hereby, authorized to begin negotiations at once for the purchase of two auto fire engines and one auto truck, the same to complete the equipment of the department."

Commenting editorially on the subject of securing new fire fighting equipment, the Waterbury American, Waterbury, Conn., has the following to say:

"Here is the point for the consideration of the good ciltians of the Walnut street district who seem to prefer a poorly equipped fire house in their own immediate terricity to the equipment of existing houses with modern automobile apparatus. On an airum from the West End today the new automobile engine from the East End reached the seeme ahead of the horse drawn apparatus from Scoville street and from the head of Willow street, though it travelled considerably more than twice as far. in other words, Conn.; Watervillet, N. Y.; Blakersfield, Cal.; Johnstown, V. Penn.; Sandusky, O.; Syracues, N. Y.; Middleboro, Mass.; Decatur, In.; Arlington, Mass.; Hrockton, Mass.; Jarkeon, Miss.; Prockton, Mass.; Brockton, Conn.; Rockester, N. Y.; Somerville, Mass.; Detroit, Mich.; Conn.; Rockester, N. Y.; Somerville, Mass.; Detroit, Mich.; Conn.; Rockester, N. Y.; Somerville, Mass.; Rockland, Mass.; Detroit, Mich.; Detroit

At the annual meeting of the town of St. Johnsbury, Vt., an appropriation of \$7500 was made for the improvement of the fire department. This led to the purchase of an antomobile truck and chemical engine.

Herewith is presented an illustration of the combination bose and ladder wagon constructed for the city of Tupelo, Miss., by the Federal Motor Truck Company, Detrolt, about six months ago. This concern furnished the vehicle and equipment complete, with the exception of the ladders. The department in Tupelo reports that it has been doing moss satisfactory work.

The chassis is exactly the same as that utilized in the Federal one-ton truck. The four-cylinder motor has a

The four-symmetry motor has a broke of 4.5, and develops 26 horseport.

4.5, and develops 26 horseport.

5.5, and develops 26 horseport.

6.6, and develops 26 horseport.

6.7, and develops 26 horsep

The clutch is a leather faced cone, and is supplied with all auxiliary springs which provide very easy engagement. The transmission and Jackshaft unit is so monated that it can be removed without disturbing any other part, or the transmission alone - an be taken out without disturbing the taken out without disturbing the jackshaft. This accessibility of parts is a decidedly innourtant



Combination Hose and Ladder Wagon Furnished to City of Topels, Miss, by Federal Matter Truck Company,

the equipping of a house in the East End has improved the West End's fire projection as much as would the establishment of horse drawn apparatus, say in the vicinity of the Green.

"The money required for a new house on Walnut street would furnish three or four pieces of automable apparatus, and these placed in the Baldwin street, Willow street, Brooklyn and possibly the Burton street house would protect the northeastern section far better than any entities being of incalculably greater value to the rest of the city. The substitution of an automobile for horses has the effect of moving a fire station at least half and probably two-thirds nearer any given point. With the introduction of automobiles the advantages of having a fire house next door automobiles the advantages of having a fire house next door have become more sentimental han real."

The following cities and towns have appropriated money for or are considering the purchase of automobile fire apparatus: Rochester, Minn.; Shawnee, Okla.; Moline, Ill.; Petaluma, Cal.; Reading, Penn.; Quincy, Ill.; Atlantic City, N. J.; Chelsea, Mass.; Marbhehead, Mass.; Southington, feature in the construction of this truck

A newspaper in Baker, Ore, held a popular voting contest recently the prize for which was an automobile. It was won by the fire department, which will have the machine fitted with chemical lanks and apparatus for the use of the chief.

REO SAVES MORE THAN COST.

One of the many instances of how the commercial vehicle effects economy is noted in the case of a Reo light delivery vehicle sold some six months ago by R. E. Ingersoll, metropolitan sales manager for R. M. Owen & Co., distributor for the Reo Motor Truck Company, Lansing, Mich. During six months the car rowered 4553 miles, making 5773 stops and the cost for gasoline, oil and repairs was 578 v. 6, an average cost of less than 1.73 cents a mile. During its service the automobile has earsed \$900.54, or \$150 more than its original cost. The machine was operated during the severe snowstorms and under conditions when the horse draw questioner for the conditions are conditioned to the conditions and the conditions are conditioned to the conditions and the conditions are conditioned to the conditions

The TRUCK Devoted to Motor Driven Business Vehicles of All Classes.

VOL. III.

PAWTUCKET, R. I., APRIL, 1912

No. 4

BOSTON SHOW BOOMS WORLD'S BEST MARKET.

New Trucks and Wagons Develop Much Interest---Many Agencies Made and Individual Sales Far Exceed Expectations---Public Accepts Results of Haulage Inquiries and Changes Methods to Adopt Power Service.

R SGARDED from any noint of view, the exhibition of power sagons made by the Bonnot Commercial Motor was the largest and most productive ever held in America. It was the first show at Boston devoted exclusive, by oservice wasnons and its success was such as to justify the satement that in future these expositions will be the most important of the year. This statement its made advisedly and with a realization of the full value of the show to the people as a whole. It is not based on the desire of the Industry or the trade, but upon the demand of the whole people for elucation in a subject that means more to them.

than any other. The service wagon is regarded primarily as being a means for economy in industry and commerce. As such It bas been exploited and its utility developed. But its usefulness may be applied to every form of transportation. Through Its use the business man max extend his activities. affording to the tenblic the advantages obtaining from the larger and carefully organized enterprises. The cost

of transportation may be said to be equal that of production. This may be the better realized from the enormous development of railreads and other means of public service. The United Stare is a nation of magnificent distances and each mile between communities has a distinct commercial value. There has been but little attention directed toward distribution with a view of conomiting selling values. Production is seldom near the supply of raw material. There has been some canaideration of this phase in metal producing and in extiles, but establishing the market cost has never been with reference to supplying the people at the lowest price that could be consistently charged. Competition has invariably dictated prices, if the market be uncontrolled.

It is entirely practicable that business development should influence the market. It is also a fact than activity should correspondingly affect it. That is to say, that it is possible through a leasured crice, this being the logical manner of obtaining public partonage. This reduction of haulage may be accomplished by the power vehicle by preforming a given service with less expense as compared with animal transport; by doing more work for no areater expenditure; by doing more work at no greater proportionate expense; by doing more work at less case.

These facts are realized by the people who have given

the subject of haulage serious consideration. The possibilitles for business have been deliberated and established. With animal transportation the timitations understood. Revond them no one cared to venture. Som e large emerorises have undertaken to extend their markets but the cost is necessarily much larker and the service has been given at what might be regarded as a loss that with the knowledge that the service vehicle



Looking Across Grand Hall from the Rateony, Showing the Power Wagon Display in December Representing a Spanish Mission Scene,

is in every way dependable and economical the business menhave found themselves facing what is no less than a revolution in methods. During the period since the practicality of motor conveyances was established there has been conviction that eventually the mechanical vehicle would be generally, if not universally, adopted for all purposes save construction within the natural initiations. The barrier has been ignorance of the actual cost of animal service and inexperence with that afforded by motor driven transports.

The point has now been reached when the value of the service wagon has been established. Its utility is acknowledged and its economy is not questioned. It is no longer an experiment. But there is realization that it is imperative



Looking Down a Long Alule in Machinery Hall with its Decorations Suggesting on Old English Rose Garden in the Early Suring.

to change the methods of delivery and distribution to obtain the fallest heading of the improved service. The concentration of the attention of the business man has in the past been on his own affairs. He has met the problems as they have appeared and worked out solutions to best serve his purposes. He has been entirely satisfied with his results. While appearently similar, it is found upon analysis that there are conditions entirely different with two concerns engaged in the same business.

The manufacturer of service vehicles has been compelled to educate the people to the actual business necessities and requirements. He has been forced to begin with his selling agents and impress upon them the possibilities for mechanical transport service. Then In turn it has been necessary to deal with all business literests to demonstrate the practicality of the conveyances. Next it has been found imperative to study each individual need and to work out solutions that are so thoroughly practical and contributions that he may be a support of the provided his properties of the provided his been adopted, Conditions have been

normal and logical aside from the fact that the business man had not been willing to apply to his own use information that had been worked out by those who had studied the subject because in his opinion, be was not satisfied that what obtained with others did obtain with himself. It has been willing to accept every other husbness principle without question and has been guided by custom and percedent, but in that concerning which he should be the best informed he has been absolutely ignorant.

The organization of the service vagon show at Boston has been extremely beneficial to the business interests in that the vehicles, always shown heretofore as secondary to pleasure automobiles, have been given the prominence they should have and the exhibition has made possible the showing of a much larger number of nikes, and of each type. This has resulted in first simulating interest in the machines themselves, as there is competition in the exhibits in everything saye service. This interest has impelled consideration of the different types In each class, and the



A Ginner into the Stand of the General Vehicle Company, Showing a Special Ambahance, Delivery Wagons, a Brewery Truck and a Charsia.



Democratic Vehicles, Conpic-Genr Gravel Cart and a General Vehicle Brever, Wagon, Amid the Hedges and Climbing Roses,

adaptation of these machines to differing service. To make clearer the result it may be said that study of a condition may establish that a specified work may be done more economically and satisfactorily with another size or type of machine than was contemplated.

But the main value to the Industry and the trade is in the fact that those who visited the exhibition have a sufficient concern to consider service waron use and to take up the study of utilization. The Importance of this to the manufacturer and the distributor is manifest. It has placed the industry on the same commercial basis that may obtain with any other. It has convinced the man of business that it is absolutely necessary for him to devote his attention and endeavors toward what has been neglected, and which must be improved to the fullest extent.

Largest Motor Truck Show,

The Boston service wagon show was the largest exhibition of these vehicles ever held under one roof. This fact means more than may appear without reflection, for not only were all vehicles so displayed that comparison

could be readily made, but there was certainty that all received the same attention. There is no question that it would be far better from the viewpoint of the visitor were the markines shown in classes and each class separated, departmentalizing by character and capacity of vehtele, but this is not possible under the system where there is a choice for some in the entire show. Were the exhibitors limited in their space selection to any given department this would seemingly eliminate a condition that was found to be decidedly unsatisfactory from the standpoint of the man who desired to see ali of a certain class of machines and was compelled to search through the entire exhibition, with no assurance that he had found all that might interest him

In addition to this there was a material delay of some of the exhibits, which was a distinct loss to the disappointed exhibitors, for in at least one instance a machine, and the only one of the make shown, was not received in the show until

the last day. Others, for which space was engaged, did not arrive. One reason was the endeavor of some of the manufacturers to make display at other shows, suffering transportation delays that were of such a nature that only by allowing the greatest margin rould the machines have been received for the opening. It is obvious that to take any chance that would curtail or reverent display at so important an exposition was ill advised. It is quite as evident that competition demands that every opportunity to obtain publicity should be accepted. To make exhibition after announcement of such showing is a duty that should be fallited, for the people who may have been attracted by that particular exhibit ought to be considered.

The number of complete wagons shown was 182, and the chassis numbered 42, this making a total of 224. In all 61 different makes were represented. The number engaging space for vehicle exhibition and entitled to representation was 44. It will be seen that average number of vehicles to exhibitors was approximately 3.66, but as a matter of fact six exhibits constituted about 33 per cent. of



Where the Decatur "Hoosier Limited" Was Displayed, the Exhibit Consisting of a Complete Vehicle and a Chassis,

the entire show, and 19 displays about 45 per cent, leavfor the other 54 about 55 per cent. Regarded shaply from the number of machines shown and the proportions as indicated, it must be admitted that the possibilities of a real buyers' exposition, such as the Boston shiew has always been, were not understood by many. This is not criticism of those who had a single vehicle to represent them, but it is meant to emphasize that those who expected to obtain the largest returns of business made demonstration of the differing forms of chassis and equipment as their spaces would neemle.

It is hardly necessary to point out how costilled it is for the man who is examining the exhibit in a show, with the intention of buying or of changing his hautage equipment, to see as many bodies as can consistently be shown, for few men can conceive the possibilities of the bare chassis. It assisted by a body building expert in night be possible to draw fairly reasonable approximations, but the nam who has practically no knowledge of body construction may be regarded as almost helpless. There are instances where but a single form of body is fitted to a chassis. It or negligence, which were emirely unnecessary.

The Search for Knowledge.

If there was one thing impressed upon those who observed the show and its visitors it was that a prospective purchaser of a vehicle was systematic in his search for knowledge, and while there may not have been a specific oldect in mind at the outset there was unquestionably a class found suited to certain purposes that impelled and received attention. This fact differentiates the service wagon exhibition when contrasted with a pleasure car show. With the prospective buyer of a wagon or truck, capacity with reference to the operating conditions is the main desideratum. There may be differing values with a single classification, but service is the first and last quality sought, and this must be lirst of all determined by capacity. It may be possible for the purchaser to determine such systematizing of his delivery and havinge that he can adapt larger vehicles than were first considered, and it may be practical to turn from the large to the smaller by adopting another system, but under ordinary conditions the buyer must be attracted by what appears to be adapted to his



The East Male of the Main Accessory Department Looking Toward Paul Revere Hall, with the Kelly-Springfield Tice Comnant's Disafay in the Foreground.

these are extremely infrequent, and it might be said that it is entirely practical to install any one of many types of construction upon a single chassis.

There was one condition manifest that should receive the most careful consideration of the exhibitors. Of the number actually showing service wagons 22 had exhibits at the pleasure car show. The strain of preparation for both exhibitions and the display and demonstration, with the additional work created by the general promotion of interest by the first show, and the inability to secure the experienced salesmen and demonstrators temporarily needed, was severely evidenced. The demands upon the exhibitors and their assistants by increased business and the activities of the show were such that the men were thoroughly exhausted and subjects that should have been given the closest attention were neglected or deferred. The interest in the service wagons was a sufficient reason to justify the exhibitor giving to each visitor every attention, yet in some instances displays were in the care of but one person for considerable periods, causing those desirous of obtaining information long walts and very evident impressions of business isxity

purposes and within his financial reach.

From the attitude of the exhibitor the show at its conclusion was a success because of its remarkable productiveness. The visitors were buyers and the exposition was hardly inaugurated before "sold" signs appeared, and as the exhibition progressed these were greatly multiplied, Business was transacted by all who had stands, and with rare exceptions the transactions largely exceeded expectations, for it was very generally assumed that while there would be prospects developed these would, if from a distance, conclude negotiations through the community representatives. The sales made were of all types of vehicle, The transition from animals to power is not confined to any classes of industry or commerce. There were, however, certain enterprises that were directly attracted toward wagons of large capacity, these including those dealing with freight and express hanlage, coal, ice and building materials, contractors, builders, and others requiring the transportation of heavy and bulky loads.

The approach of warmer weather and the resumption of construction work of all kinds was a cogent reason for the keen concern manifested by those efigaging in such undertakings, and the anticipated activity in the coal and ice markets, as well as the impending removals of thousands from winter to summer recidences had the effect of alimalating those who transport them to greenantions to meet with the expected increase in demands. But beyond this was an intense desire to acquire information relative to all manner of transportations. One of the facts strongly impressed upon the observer was the acceptance by those in budgiess of the knowledge of the manufacturers and salesmen of all countries of the subject as a whole and understanding that what had been recarded as theory was accurate information based on careful compilation of data accumulated from insumershies sources.

Until now there has been general assumption that it is impossible for a man, however expert, to determine the relative expense of animal and motor transports, but it has been proven by statistics that cannot be rejected that there

Details of the Exhibits.

The exhibits were as follows

Alco-One two-ton and one 3.5-ton truck, and one fiveton chassis.

Atterbury One 1500-pound delivery wagon, one oneton delivery wagon, one 1.5-ton delivery wagon, one twoton delivery wagon, one three-ten truck, one 20-pass ager omnibus

Autocar Six 1.5-ton delivery wagons, one ambulance, one 15-passetiger omnibus, one 18000-pound chassis, one 1590-pound chassis.

Bessemer One one-ton delivery wagon

Buick - Four one-ton delivery wagons, one combination chemical fire apparatus.

Baker electric Two 1000-pound delivery wagons, one two-ton chassis.

Chase-One one-ton delivery wagon, one 1.5-ten delivery wagon.

Clark-One three-ton truck



The Exhibit of the Firestone Tire & Rubber Company, Which Consisted Wholly of Shorn Beeigned for Benry Vehicle Service.

is not only a sufficient economy to justify the adoption of the service waxon, but as the animal vehicles are eliminated there will be a saving proportionate to the use of the power conveyances. The realization of the proportions of the haulage problem and the possibilities for service vehicles has been very general and there is reason to believe that there will be as the result of the show a constantly increasing market for all forms of waxons and truck.

One evidence of this was the considerable number of accretics made by makers and distributors. This insures to many active representation in localities that had previously been neglected and which are regarded as extremely promising. The opinion is well established that here ought to be the same constant market for service wasons that has obtained in the past with animal scheller, and there is a presailing belief that the establishment of service stations that will afford to those whose requirements are not such as to justify a giving garage whatever attention is necessary or destable, is the next toleful development. Commer One 6.5-ton dumping body truck, one 6.5-ton chassis.

Commerce—Two Dueu-pound delivery wagons, one 1000-pound chassis.

Couple-Gear electric-One five-ton dumping cart, one five-ton bottom-dumping wagon.

Chalmers One 1000-pound rovered delivery wagon.

Decatur.-One 1.5-ton delivery wagon, one five-ton

chasels.

Dayton—One 1.5-ton delivery wagen, one three ton truck, one five-ton chassis.

Eckhard One five ton chassis,

Ford One 700-pound enclosed delivery wagon

Federal Two one-ton delivery wagons, one one-ton chassis.

G. M. C. gaseline. One one-ton delivery wagon, two two-ton delivery wagons, two 3.5-ton trucks, two five-ton trucks, one two-ton chassis, one 3.5-ton chassis.

G. M. C. electric-One four-ton truck, one five-ton truck,



The Model A Morgan Truck, Five Tons Capacity, the Latest Development of Heavy Vehicle by the Maker,

one three-ton chassis.

General Vehicle ejectric—One one-ton delivery wagon, two two-ton delivery wagons, one five-ton truck, two twoton chassis, one ambulance.

Grabowsky—One one-ton delivery wagon, one five-ton chassis.

Garford—One 1.5-ton delivery wagon, one five-ton chamis.

Gramm—One one-ton delivery wagon, one two-ton delivery wagon, one three-ton truck.

International Harvester—One 1000-pound delivery wagon, one t500-pound delivery wagon, one 2000-pound delivery wagon.

KlaselKar.—One one-ton delivery wagon, one two-ton delivery wagon, one three-ton truck, one one-ton chassis, one four-ton chassis.

Kelly—Four 1.5-ton delivery wagons, five three-ton trucks, one four-ton truck, one omnibus on 1.5-ton chassis, one sightseeing wagon with 1.5-ton chassis, one 1.5-ton chassis.

Kochler-One 1600-pound delivery wagon.

Knox—One two-ton delivery wagon, one three-ton truck, one six-ton chassis, one patrol wagon, one combination hose and chemical fire wagon, one 60 increpower fire pumping engine and combination apparatus, one Martin tractor.

Lauth-Jucrgens-One three-ton truck, one one-ton chas-

Locomobile-One five-ton chassis, one combination hose

and chemical fire wagon.

Lozier-One live-ton chassis.

Lansden electric—Two one-ton covered delivery wagons. Mack—One 1.5-ton furniture wagon, three two-ton de-

livery wagons, one three-ton furniture van, one three-ton oil tank truck, one five-ton browery truck, two five-ton coal dumping body trucks, two seven-ton gravel dumping body trucks, one two-ton chassis.

Mais-One 1.5-ton delivery wagon, one two-ton delivery wagon, one 1.5-ton chassis.

Martin-One three-wheeled tractor.

Mercury Three 1000-pound delivery wagons.

Modern-Three 1500-pound delivery wagons.

Mora—One 1000-pound delivery wagon.

Morgan—One two-ton delivery wagon, one three-ton truck, one five-ton truck.

Motor Wagon - Two 1000-pound delivery wagons.

McIntyre-One two-ton delivery wagon.

Packard—Eleven three-ton trucks with different body equipments, one two-ton truck, one two-ton chassis.

Peeriess-One three-ton truck, one four-ton truck, one five-ton truck, one three-ton chassis.

Pierce-Arrow-Three five-ton trucks, one with dumping body, and one five-ton chassis.

Pape-Hartford-Two three-ton trucks and one combination chemical and hose fire apparatus.

Poss-Two 1000-pound delivery wagons,

Sampson-Two 1000-pound delivery wagons, two 1.5-



The Kelly 1.5-Ton Wagon Chassis, Which is of New Construction from the Power Plant to the Rest Axle,



Combination Chemical Engine and Hose Wagon Equipment Installed on a Knox Chamb

ton delivery wagons, one three-ton truck, one five-ton truck and one five-ton chassia,

Sanford-Two one-ton delivery wagons.

Sandusky Two 1.5-ton delivery wagons,

Speedwell.—One two-ton delivery wagon, one four-ton truck and one six-ton truck.

Stanley steam.—One one-ton delivery wagon, one 12passenger omnibus.

Stearns - One five ton truck

Sternberg-Two two-ton delivery wagons, one four-ton chassis.

Saurer One 4.5-ton truck, one 6.5-ton brewery truck, one 6.5-ton chassis, one fire pumping engine,

Overland One 1000-pound delivery wagon.

Bro-Three 1500-pound delivery wagons.

Tecl-Woodworth Two three-ton trucks, one three-ton

chassis.

Velic-One three-ton truck, one three-ton chassis, one

five-ton chassis,

Victor—One 1.5 ton delivery wagon, one 3.5-ton truck.

Walker electric: Two one-ron delivery wagons, one one-ton classis.

White—One 1.5-ton delivery wagon, one two-ton delivery wagon, four three-ton trucks, two five-ton trucks, one 1.5-ton chassis, four three-ton chassis, one five-ton chassis

Vinges Equipment fastation on a Nast (name)

Waverley electric-Two 1500-pound delivery wagons, one 1500-pound chassis.

Seen for the First Time.

The makers of wagous shown for the first time at any show were the Clark, Eckhard and Stanley. Those displayed for the first time at any national exhibition were the Chalmers, Couple-Gear, Ford, Mora and Teel-Woodworth, and the Mais was seen for the first time at any 1912 show.

The makes that were not represented at the 1811 exhibition were the Beasemer, Baker electric, Chalmers, Commerce, Federal, Gramm, G. M. C., gasoline, G. M. C., electric, Kiaserskar, Koehler, Lanaden, Lauth-Juergens, Loo-comobile, Lozier, Mack, Mais, Nercury, Nodern, Mora, Motor Wagon, Martin tractor, Pope-Hartford, Poss, Reo, Sandusky, Sanford, Saurer, Stearns, Sternberg, Velle, Walker and Warreley.

The makes that were displayed in 1911 were the Alco, Atterbury, Autorar, Bukk, Chase, Commer, Dayton, Catter, Garford, Grabowsky, General Vehicle, International Harvester, Kelly, Knox, Morsan, Melntyer, Overland, Pack, ard, Peerless, Pierce-Arrow, Sampson, Speedwell, Victor and White.

Those that made display in 1911 that did not engage space included the Atlas, Beyster-Detroit, Brush, Cass, Detroit electric, Franklin, Harder, Harrison, Hupmobile, John-



The Beasemer Delivery Wagon, One Ton Capacity, the tinty Vehicle Exhibited Equipped with a Self-Starting Device.



Locomobile Five-Ton Truck Chansis, Exhibited Above a Mirror with the Mechanism Exposed So That the Construction Could Be Clearly Seen,

son, Randolph, Stoddard-Dayton, Warren-Detroit and Wilcox. The Rapid and Reifance have been succeeded by the G. M. C. gasoline vehicles, and the Ford taxicab and the Clark two-cycle motor track were succeeded by the machines stated above.

The largest number of chassis shown was 14, the Kelly and the White each making that display. The Packard was second in point of numbers with 13, the Mack and G. M. C. third with 12 thoth electric and gasoline being shown by the G. M. C., the Autorar fourth with 18, the Sampson fifth with seven, the Atterbury, General Vehicles and Knox sixth with six each. Of the other exhibitors three showed five chassis, three four chassis, 15 three chassis, 14 two chassis, and 12 but one chassis.

The largest number of bodies shown of any one make of chassis was by the Kelly trucks, all the chassis being fully equipped save for one polished 3000 pounds capacity marchine. Next was the Packard which showed 12 complete trucks and one chassis in the lead. Third in this classification was tie G. M. C. with nine bodies, and the Wilter and the Autocar were fourth with eight bodies each. Somewhat out of the usual manner of exhibition was the showing of the Kechler wagon, there being one chassis with an enclosed body and two bodies of other types, this giring the visitors opportunity of examining the equipment and passing upon the qualifies as shown.

The Matter of Motive Power.

With reference to the motive power of the vehicles 53 makes were fitted with internal combustion engines, and of these 48 were of the water-cooled type, there being the

Chase, International Harvester, Mercury and Saford in the indufart. Indiation classification, and the Kelly with blower cooling. Of the others the linker, Couple-Gear, G. M. C., General Velle, Lansden, Walker and Waverley are electric motor driven, and the Couple-Gear and the Walker are equipped with wheel drive. The Statley machines are fitted with steam engines in every way similar to those used in the Statley pleasure ears, but the chassis construction is different.

While there was a gain of 19 different makes of cars in the total of exhibitors one of the con-

ditions that emphasized liself was the increase of the electric wagons and trucks. The gain was from two a year ago, and while the Baker, Walker and Waverley are of the delivery wagon type, the Couple-Gear installations have been with particular attention to slow and heavy work and the G. M. C. vehicles are designed for moderate and heavy loads. There has undeniably been an interest created in ejectric machines that are intended for all classes of service and the attention of the manufacturers has been directed toward undoubted advantages of these vehicles for certain service. In the utilization of electric wagous the very rapid increase in the number of stations where energy may be obtained, and the prepara-

tions made by lighting and power plants to include vehicle battery charging as a public service, one of the obstacles to more general use has been largely dissipated, especially in the East, where these stations are to be found and where the price for charging has been uniformly established

That the distance is really no serious condition was practically demonstrated when a Walker delivery wagon was driven from New York to Hoston, the conditions being at least the average of a winter, at a speed approximating to mittee for the time artually on the road. The wason was exhibited at the show as it came over the road. The battery was given a "boost" wherever there was opportunity and the wagon was driven with ample reserve under all conditions of use

Rated as to Capacity.

in considering the different vehicles exhibited and their enjuelties it will be realized that approximately 70 per cent, were of three tons or less, and it is interesting to reflect upon the following ligares, which indicate that the waxons and trucks are types that ought to have material rapidity of movement. The summary demonstrates the following facts:

Capacity.	Number	Capacity, journds	Number
700	- 1	7,000	- 7
0.000	22	5,000	6
1.500		5,000	1
1,600		111,4110	. 29
2,000	26	12,000	2
3,600	28	13,000	4
4,000	27	11,000	2
6 0000	4.4		



The Kelly 1,5-Ton Chassis Equipped for Fire Service as a Cambination lione and themical Apparatus.



The Kans Truck Chassis of Six Tons Capacity, This Machine Being Dispinyed for the Pirst Time in Boston.

Regarding these figures as fairly representative it will be understood that the colverentation is largely of vehicles that may be classed with heavy express wagons, there hedge a very uniform demonstration of the different classifications. The light wagon may be assumed to have capacity of 1000 jounds, the medium wagon from 1000 to 3000 when drawn by a single horse, the heavy wagon from 3000 to 5000, the light truck or dray from 3000 to 1000, the heavy cart or truck from 1000 to 10,000 when drawn by three of four animals. For unusually heavy service the dray or truck may be specially constructed to have capacity in excess of these figures. It will be understood that the reference to animal vehicles is made with the view of making clear the types of service wagons that may be regarded as suited for similar resultements.

A glance at these figures will also show that despite the supposition that the power wagon is necessarily heavy and has very large capacity the larger number of the machines purchasable in the market are what may be adapted to practically any haulace. Another fact impressed upon the observer is that the makers are producing wagons that are light, comparatively high powered, and with such speed as to justify a conclusion that they could be well adapted for delivery purposes.

The opinion prevails very generaily that the greatest economy of the service wagon is in superior speed, next in its greater capacity, then in its uniformity of work for a considerable period, and in its reserve as compared with the animal. It is also assumed that increased load is the most potent qualification, especially if the hauls are long, but it would apnear that the oninion of the designer and maker is that the largest utility obtainable is comcorntivoly small loads and material speed. Though it cannot be said that the exact aspect can be obtained from a single exlabition, it is entirely reasonable to base a conclusion on a display that is in every way representstive with reference to the industry the trade and the market

Relative to tracks of 10,000 pounds capacity or more the equipment was designed in the greater number for haulage of cost, ice, gravel and building and construction material Being designed for such service the bodies were generally fitted with means for quick discharge. Some of the bodies, especially those installed on White, Peerless, Sampson and Alco trucks were elevated by power hoists. These were of differing types, those of the White and Alco being arrangements of compound gears, that of the Peerless by a worm and nut, and that of the Sampson by an air compressor. These hoists were all fitted with stone so that the power might be automatically stopped when the bodies reach maximum elevation, there being no possibility of mis-

hap in the event of carefessies by the driver or operator. The principal purpose was primarily to milmize labor and expedite the time of discharging. The elevation of any body means a gravity discharge into cinter or through end gates, an entirely satisfactory method under some conditions, but for the unloading of coal in the street, especially if the way be narrow the side discharge is desirable. This is accomplished with the Monahan body equipment of the six-ton Speedwell truck by forward or rear side outlets, in addition to the large end gate, by which the tood may be carried across walks or to machioles by cluttes. This machine is equipped with a hand hoist by which the tood was be raised to a maximum of 42 degrees by the driver in two militares.

The Morgan coal struck is shaped internally with the sides and ends forming a hopper with sides inclined about 35 degrees. The load is discharged through an outs; at the right side by a hope worm that revolves in a channel into which it descends by gravity and into an adjustable circular chate that may be extended from the side direct to a manhole or coal bin line; The majority of the other coal or building material trucks, including the Pierce-Arrow, Packard, Perelas, Kelly, Mack and Commer, were equipped



Eckaned Sta-Cylinder Truck, the Only Machine of Thin Type Dispinyed at the Boston Show-This Vehicle Has Many Exclusive Festures,



The Mercury Delivery Wagon, This Chanala Having an Opposed Cylinder Air-Cooled Motor cred body will not serve all reand Transmission in a Unit taxembly,

with hand hoists and the discharge was generally at the rear rate. There is no question that the power hoist has many advantages and is desirable equipment, but most installations may be adapted to any truck. The expedition of unloading is a weighty factor with those who are engaged in construction and confract work and there is but little doubt that there will be special attention directed toward the improvement of the facilities that are now available.

Distribution of Load.

With many of the hodies carried on trucks it would appear that the one condition that could be studied advantageously is that of the location of the centre of load gravity. With the general construction the increased tread is a result of the width of the wheel rims, the ribs being often 12 or 14 inches wide, and this means from 24 to 30 inches must be allowed aside from a reasonable clearance outside of the driving chains. With many chassis the frame is carried above the rear springs instead of being suspended between them, and to permit sufficient compression and recoil of the suspension to absorb the shocks, the frame is considerably above the axie. This condition heightens the centre of gravity and when the load is bulky the weight is not equalized. There is apparently no unanimity of opinion as to the best form of body to be adapted to certain work. In fact, it would seem that there is as much variance in design as there is in any other mechanical construction.

Perhaps one of the most noticeable facts impressed upon the visitor to the show was the difference in the proportions of load with reference to the front and rear axies. The range for the front axle is from five to 35 per cent, and from 65 to 95 for the rear axie, this applying, of course, to the trucks, and especially to the largest types. With the lighter vehicles the proportions are much more uniform and it may be said that the variance is about 15 per cent, from 65 to 80. The wagons with capacities from 700 to 1600 pounds were often fitted with open bodies, it apparently being an assumption by the makers that these could be enclosed at will by the huyers, but it would appear that this is a condition that has not been as carefully considered as it should.

During the winter months the power vehicle must be driven through snow and slush, there being no substitute for it as the sleigh is occasionally utilized in the place of the wagon or truck, and for that reason it is desirable that it have such enclosure as will protect the freight, especially if the service be delivery. This protection is necessary during storms and against heat and dust, and there is need of sufficient carrying strace to take a capacity load should the freight be bulky. This means that a single type of covquirements and it is just as neces-

sary to adapt the light vehicle to a service as to adapt a heavy machine. There is no reason to believe that a standard body installation still serve the maker as an identification of a vehicle. Should there be such supposition it is reasonable to assume that this will be a handicap to marketing instead of a stimulus. Taken as a whole there was not the improvement made in vehicle bodies as in the chassis. This is probably due to the fact that the makers of the wagons have not a realization of the extreme variation in requirements, and to inexperience with demands that will be made upon them with the increased use.

The Clark Truck

A truck that attracted much attention was the Clark, built in Boston by Edward S. Clark, who has been for years identified with the industry, but until the past two years principally by specialized steam pleasure cars, of which he produced a limited number. Last year Mr. Clark exhibited a power wagon with a two-cycle engine as a power plant. This design he has given over and is now initing two types, one of three and the other of five tons capacity. The machine shown was the three-ton model, and there was also displayed the front and rear axies, jackshaft and radius rods of the larger truck.

The Clark truck is noticeable from the fact that it combines every desirable quality that long experience could



The Kochler Wagon Chassin Equipped with an Open Express Body, This Having a Capacity of 1600 Pounds.



The Poss Delivery Wagon Chassis with Friction Drive and an En Bloc Motor of 25
Horsepower.

suggest, and the design's purpose was to insure services and endurance with economy of time of the vehicle and the driver in the attention necessary to insure maintenance and upkeep. The motor is mounted in a sub-frame and so low that the footboards of the driver's cab are well above it, so that there is abundant light and space for one to work on the engine under any circumstances. The motor is unnaully clear of fittings and for the ordinary adjustments and attention it is not necessary to remove wiring, levers, linkage or any of the obstructions that might be expected. The steering, brake and transmission connections are installed at either side and above the motor so these may be easily reached and be out of the way of any one working on the power plant.

The motor cylinders are cast en thoe with lowe of 4.125 inches and stroke of 5.25 inches, the eaglie being rated at 35 horsepower. The casting is carefully finished and very careful workmaship is noticeable throughout the assembly. The water Jackets are illieral in size and the water is circulated by a large certificial jump, the cooling being by a large vertical tube radiator and a fan mounted forward of the engine, driven by a flat helt. To insure complete lubrication two great driven plunger jumps operated by the cameshaft are used. The oil is carried in a reservoir in the base of the engine case and from this the lubricant is drawn through filters and circulated through a system of tubes to a sight feed on the dash and thence the main bearings are

flooded whenever the motor is inoperation. There is a level of inbrienat maintained in the engine ase and the other moving against of the motor are inbriened by spinsh. The limition is a dual system using the flooch high-tension magneto, the wiring being experially well protected from wear and saturation by water including the floor of the property free in by a fond feed carburetion of fremity of mixture.

The clitch is a cone type engaging with the flywheel and under the leather facing flat springs are installed to prevent harsh or sudden enagement. The drive is by shaft to a Tinken rear driving system, through a large jackbaft and double side rhalm to a dead rear axle. The transmission gearset is a selective type with three forward speeds and reverse, it being fitted with Timken adjustable relier bearings throughout. The jackshaft is equipped with a locking device by which the differential may be locked and the rear wheels driven as a unit in the event of unequal traction. This lock is operated by a handle at the left side of the chassis frame. On the jackshaft is the service brake operating on drums 12 inches in diameter and 2.25 inches width, being actuated by a pedal. The emergency brake is by expanding shoes within drums 18 inches diameter on the rear wheels, operated by a band fever that may be set by a pawl and

notched quadrant. The frame is six-inch rolled seed channel section, 42 linels width and length proportionate to the body. The standard wheelbases are 120 and 130 inches. The tread is 68 inches. The trane is built with heavy cross members and is strongly braced, it is mounted on semi-clipite parings 42 inches length forward and 52 inches length frare, three linelses width. The rear suspension is supplemented by a heavy cross spring that strengthens the action proportionate to the load carried. The from axie is a drop forced seed 1 section and the rear axie is a rectangular steel forging 2.25 by 3.625 inches. The wheels are 26 inches diameter, mounted on Timken roller hearins, with 36 by divestich solid shoes forward and 36 by four-inch doal at the rear.

The control is by a vertical steering column located at the left side, pedals operating the clutch and service brake, hand lewers at the centre that actuate the speed changes and the emergency brake, and hand levers on the steering wheel controlling the throttle and the iznition. As regularly geared the truck has 12 miles an hour maximum speed. The manner in which the classis frame is mounted on the forward springs, there being a short and heavy spring horn, the installation of the radiator on telled springs carried in substantial tubing to eliminate the vibration of the truck on rough roads, the greate cups on every wearing part of the chassis, the location of the 26 gallons capacity gasoline tank under the driver's seat, the jointed starting crank.



The Mora Delivery Wagon, with an Opposed Water-Cooled Engine, Left Side Drive and Centre Control Levers,



The Teel-Woodworth Truck of Three Tons Unpacity, Which Has Flaed Spark and Foot Accelerator Control.

the heavy tube bumper to protect the radiator and the lamps, the strength of the steering connections and the tiebar, indicate a studied attention to design detail that appeals to the mechanical mind.

Eckhard Six-Cylinder Model.

What may be regarded as the novelty of the show was the Eckhard five-ton track, another Boston production, made by the Hercules Motor Truck Company, which was fitted with a six-yillader motor of highly commedable dealign and linely finished. It is rare indeed to find a pleasure car engine that has been as carefully built, the work-manship being such as to attract the attention of every engineer and mechanic. It was exhibited as the result of 12 years' experience and experiment, and the features, andder from the motor, are the double clutch, the interlocking device, the torsion bar, the torsion chain, and the governor. It is the design of John Eckhard and there is in every detail the evidence of the care to construct what will yield scribe and endure under extreme conditions.

The engine is of the valve-in-the-head type with the cylinders cast in pairs, having hore of 4.5 line-bra and stroke of five inches. The horsepower rating by the S. A. E. standard is 48.6, but the maximum service speed permitted is you prevolutions, at which, by brake test, 54 horsepower has been developed. In the engine every element has been designed with a view of securing the height of accessibility, and there is no operation or work necessary under ordinary conditions that cannot be performed with extreme case.

To Illustrate, the valves are operated by onshrods lifted by a camshaft at the right side. The valves are all installed in separate cages and each pair of cages is retained by a yoke which may be removed by turning off a single nut, this permitting the cages to be taken out. The cams are large and the pushred lifts are in the form of square sleeves fitted into steel guides, the sieeves carrying large hardened steel rollers, this minimizing the wear. These guides are yoke retained and can be lifted out by the removal of a voke retained by a single nut.

The rocker arms are of splendidy finished bronze and they are pivoted on hardened steel plus of large size, the bearings being lubriested by oil duets drilled in the rocker arms which are supplied from individual oil wells. Should it be necessary the main bearines, connecting rod bearings, and the laterior of the ensine may be reached by removing a coverplate extending the length of the transcence, at the left side, while three large hand holes afford access as desired at the other side of the case. The single cambiant drives a series of beel gears and in tim actuates the water pump, the oil pump, the magneto and the governor. The gearare encased by a bronze housing that may be readily renoved and an extension of this protects the governor, which so of the ball type. The crankcase is of aluminum.

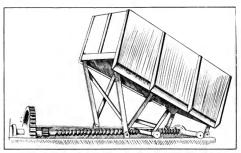
The cooling system is unusual, having very large water capacity and generous water spaces, the jackets being designed to secure rapid circulation. The water pump is of correspondingly large capacity and is installed in a bronze housing. The radiator is bolted to the main frame, its construction being such that it is not subject to damage from vibration. The top and bottom sections are bronze castings and copper tubes with large flanges for radiation are swaged into them, being expanded in the holes as are steam botter tubes. The tubes are very heavy and are numerous, the flanges greatly increasing the radiating surface. The tubes are protected by an iron screen installed before them on the radiator frame, this being carried upward to support the forward end of the cab roof. The engine is further cooled by a large blower with bucker shaped blades that causes a circulation through the radiator.

The engine indirication is by a gear driven pump that circulates a sinply of oil dirough a system of those and a sight feed on the dash direct to all learnings and to each cylinder, and by splash, there being a constant level maintained in the base of the engine case. The fael is vaporited in an automatic float-feed carburetor, this being water jacketed to afford a constant quality of rax. The Ignition is by two independent systems and 12 sparts plugs, using the Bosch high-tension magnet of or the one, or the softened to the splane of the other These two systems may be used simulations will desired.

The motor is installed in a sub-frame that is mounted at the forward end on the heavy chasis frame. The roar of the sub-frame is supported at either side by switched like from a wide yoke that is pivoted on a frame cross member. The driving system is unique in that there is between the motor and the differential two cone clutches. These clutches are very large and both are of the reverse playe. However the forward clutch and transmission is a universal joint and the connection with the mainshaft of the transmission is keytile.



Clark Three-Ton Chassis, 35 Horsepower, with En Blue Engine, Fitted with a Furniture



Steel Lined Wood Coal Rody with End Discharge, Elevated by Horizontal Worm and Gray Rulat Operated from the Oriver's Sent, Installed on a Peerless Chansis.

and the shafts and gears are nearly double the size of those desirned for vehicles of this class. Between the differential and the extension of the main transmission shaft is a second clutch. There is an interlocking system by which when the clutches are disengaged the transmission shaft is brought to an instant stop by a brake and change of speed can only be made when the transmission gears are not moving. The vehicle may move shead by its momentum but the gears cannot clash nor can they be stripped. The teeth are rounded so that engagement may be made under any condition.

The transmission case is carried in a sub-trane, the forward end of which is suspended by swivelled links from the arms of a yoke plyored to the heavy frame cross member, exactly as is the motor sub-trane. The rear end is suspended from a cross member behind the jackshaft. There are no stresses upon the driving system and it is manufacilled that under no circum-

manimated that under no creums sinces will frame distortion have any effect upon the shafts and transmission, while the silicament will always be preserved by the radius rods. The drive from the Jackshaft is by double side chalms. The frame is mounted on semiplemented by putented helpta springs, interpood between the axies and frame, these taking the load and reducing the stress upon the main springs in proportion to the media.

Extending from the centre of the rear axis to the centre of the rear axis to the centre of the front take is a long rod that is fitted with a heavy spring buffer at the forward end. The function of this device is to earry the drive of the rear wheels to the forward sale, to distribute the read shocks on the front wheels to the rear unequal movement of the axies in this respect it serves as a distance rod and has precisely the same effect as has the perchase of the

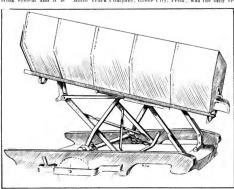
animal wagon. To prevent the turning movement of the rear axle resulting from driving and braking action a torsion chain is used, this being attached to the centre of the rear cross member of the frame and extended to the end of a stout arm mounted on the centre of the rear axie and rising to a sufficient height to afford fuil leverage. The entire construction is with a view to minimizing the strain that might result from work under extraordinary conditions, as from striking obstructions of any kind.

The frame is of heavy steel channel section, strongly reinforced and hot riveted. The wheels are 60 inches diameter and the tires are six inches, single forward, and five linches, dual, rear. The wheelbase is 144 inches. The control is by a pinon and

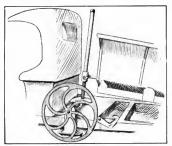
sear connection and a vertical steering column, with ignition and throttle lever mounted above the steering wheel, by clutch and service brake pedals, by foot accelerator, and by speed change and emergency brake levers at the right of the driver's seat. The service brake is with contracting bands operating on brake drums on the jackshaft, and the emergency brake is with shors expanding within drums on the rear wheels. Both brakes are very jarge and efficient. As a further protection there is a double sprag of heavy construction that may be dropped at will by a hand lever at the driver's seat. The capacity of the gasotine tank is 22 gallons, there being a rewert tank containing it wo gallons that may be drawn upon when the main supply is exhausted.

Bessener Delivery Wagon.

The Bessemer delivery wagon, produced by the Bessemer Motor Truck Company, Grove City, Penn., was the only ve-



effect as has the perches of the Steel Cont Hody with Chute Hischarge at the Rear. Elevated by Power Holst, Capacity Five Tons, Mounted on an Aleo 3.5-Ton Channis,



Worm and Nat Hand Holat as Fitted for Use on a Pierce-Arrow

hicle designed for purely industrial purposes that was shown with a self-starting device. This machine was noticeable for the strength and simplicity of its construction, it being maintained by the maker that it has every quality that makes for long endurance with heavy service. The capacity is one ton. But one type of chassis is built, this being with wheelbase of 107 inches. The four-cylinder motor is of en bloc construction with bore of 3.75 inches and stroke of 5.25 inches, which has an S. A. E. horsepower rating of 22.5, and is conservatively rated at 25 horsepower by the maker. The motor is water-cooled and the water is circulated by a centrifugal pump. The radiator is large and is supported by springs to eliminate vibration stresses. The lubrication is by mechanical force feed to the main engine bearings and splash. The ignition is by the Bosch dusl system with high-tension magneto. The carburetor is a float feed type, automatic in action, supplying a constant mixture

The clutch is a cone with cork inserts, having 110 square inches of frictional surface, insuring against harsh engagement or slipping, being always positive in its action. The transmission is a selective type with three forward speeds and reverse, with nickel steel gears and shafts, the gears having .9375 inch face. The drive is jackshaft and double side chains to a dead rear axle. The chassis frame is a pressed steel channel section and is strongly reinforced, it is carried on semi-elliptic springs forward, 39.5 inches length and 2.25 inches width, and platform suspension at the rear with springs 45.25 inches length and 2.25 inches width. The front axle is a nickel steel I section with spindies 1.6875 inches diameter, and the rear axle is of the same material with spindles 1.9375 inches diameter. The wheels are 34 Inches diameter, with 14 spokes, the forward tires being 34 by three inches and the rear tires 34 by 3.5 inches. The control is by a steering column at the left side, with clutch and service brake pedals and speed changing and emergency brake levers in the centre. The brakes are external contracting and internal expanding with 14-inch brake drums on the rear wheels. The turning radius of the wagon is 33 feet, especially adapting it for service in congested traffic.

The New Chalmers.

The Chalmers light delivery wagon chassis is a model. M pleasure car construction with adaptations that strengthen it for continuous service. The chassis frame is straight and longer and the springs are heavier, and the speed is reduced by gearing the moor four to one. The wheels are

fitted with 34 by 5.5-inch pneumatic tires. The capacity is 1000 pounds. It is furnished with three types of body, an open express, or with enclosed body with curtains or panel sides. The open body has a load space 16.5 by 22 inches, and the close bodies have the same area with a height of 60 inches. The maker is the Uhalmera Motor Company, Derfelt.

Couple-Gear Vehicles.

Exhibited for the first time in the East were the Couple-Gear contractor's wagons made by the Couple-Gear Freight-Wheel Company, Grand Rapids, Mich., these being designed especially for haulage of heavy loads under conditions where ordinary power vehicles could not be used advantageously. Two were shown, the one being a Philadelphia dump cart and the other a bottom-dumping wagon. With these the wagon bodies are mounted on heavy dead axies and large wheels, these being fitted with steel tires, The wagon frame is extended forward of the hodies and the front wheels are replaced by the motor driven disc wheels peculiar to the Couple-Gear vehicles. In brief to the heavy wheel spindles are fitted electric motors each having a normal capacity of three horsepower. The armature shaft of the motor extends to the periphery of the discs forming the wheel, pinions at either end of the shaft meshing with racks integral with the discs. Outside of the discs is placed the wheel rim and the tire

The energy is supplied by a battery varried under the seat of the driver. The control is by a lever, as is the electric street car, giving five forward speeds and five reverse speeds. As the motor revolves the pinions at the ends of the shaft turn in the racks and cause the wheels to revolve. As the pinions have nine teeth and the racks 240 it will be seen the reduction in 25.66 to one, this permitting the utilization of the power slowly and with an efficiency that is claimed to be 57 per cent. With this form of vehicle it is maintained that the pulling capacity of the motor is greater than its pulling power, that these wheels permit the use of standard waron construction, that the large rear wheels minimize the tractive effort, can be drawn over road obstructions readily, reduce the vibration and can be used with better results in soft ground.



Poeumatic Hoist, Driven by Power Air Compressor, a Feature

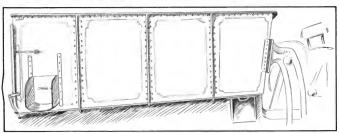
Steering the driving wheels always causes the tractive offort to be in the direction in which the vehicle is moving. The construction is not designed for speed, but for continuous work. About 50 per cent. of the load is carried on the steel tires. These carts are bulk with capacity from one to five tons. The same company bulks all manner of the tery that is constantly charged by a gasoline motro operated tery that is constantly charged by a gasoline motro operated on the truck. It also builds tractors with gas-electric power plants that are fitted to draw loads carried on two larged wheels with steel tires, these being another adaptation of the damping wagons. The trucks are constructed to six tons capacity.

The control of these wagons is such that they can be bandled by one not possessed of mechanical knowledge, the main requirement being judgment of speed and distance. As the load speed is show if we miles an hour, and the maximum pace shout seven it will be seen that speed is not an element of danger. Instead of the usual voltamenter is fitted the Sangamo ampere-hour meter which indicates zero on a dial with amperes as the scale unit when the hattery is fully charged. As the hattery is drawn upon the meter shows the exact energy remaining in the battery.

as these are capable of yielding an overload capacity of 300 per cent, for a limited period it will be understood that this equals 18 horsepower whenever that energy is needed. Tecl-Woodworth Display.

The Teel-Woodworth truck of three tons capacity was shown for the first time at a national exhibition and attracted much attention because of the practicality of the design and the substantial construction. The truck is built by the Teel Manufacturing Company, Medford, Mass., a firm that has produced animal vehicles for nearly a century, and which has in recent years devoted some of its activities to producing high grade automobile equipment. The company is widely known to the automobile industry, but only recently has it engaged in motor vehicle construction.

In producing the truck the designer has made no experiments. To the contrary he has combined elements produced by manufacturers of reputation, there being a Continental engine, for instance, a lifel-Shaw multiple disc clutch, a Cotta transmission, a Timken jackshaft, rear and front axie and brakes, a Ross steerling gear, and a Mayo radiator, these being incorporated into a vehicle that has been created to afford a maximum of everyday service, to be operated with fullest economy.



Manahan Body, Affording Forward and Rear Side and Rear Discharge, with Hand Hoist, Six Tana Capacity, Exhibited on Speedwell Chassin,

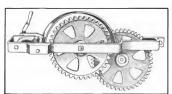
in amperes, and so at any time the condition of the power is shown. It is possible to reduce the battery to the capacity. The indication is not changed until the hattery is charged when the dial will show the process of charging as it did discharging, and when the charging is complete the circuit is automatically cut off, so that the only operation necessary in storing the hattery is to make the connection and leave the wagon.

The wheels are accessible by hand holes in the outer dises so that the arte spindles, the bearins, the moor, the shaft, pinions and rack are convenient for examination or work. There is no other mechanism save the steering linkage and the steering column, and the driver has hut comparatively little labor to perform. So far as simplicity and durability are concerned it is maintained that these vehicles may be used without regard to the ordinary attention given to motor driven which.

The display was wholly for the benefit of those engagine heavy haulage and was with regard only for those who have to do with a character of service for which the horses are even now considered to be best suited. It is possible, however, to employ these wagons for excavating and similar work. Incidentally the motors are of three horsepower each, making a total of six for the vehicle, but

One of the objects sought was to eliminate many of the ordinary causes for delays, and to secure this every element that might be subject to derangement has been safeguarded. In other words the truck has been made as nearly fool proof as long experience would dictate was destrable or necessary. All the parts are jigged to insure perfect interchangeability, these being produced by one of the best known of the fine machine builders. All of these parts are carried in stock and may be obtained quickly. Practically all the bolts are of four sizes, standard thread, and these may be purchased in any good hardware store in the country. Every nut and bolt is cotter pinned, two sizes of pins being used. All the small pins and shafts are hardened and ground. The spring eyes are bronze bushed and should wear indefinitely but the bushings may be replaced with slight cost. It is maintained that these qualities make for inexpensive upkeep and insure against delay.

The motor is water-rooled, with the cylinders cant in pairs, and is raided at 30 horsepower by the S. A. E. power standard. The water is circulated by a centrifugal pumpand a fan driven by a helt. The radiator is of large capacity and the engine will not heat under any condition of operation. It is lubricated by a gear driven pump from a reservoir integral with the engine case that floods the



Hand Lever and Gearing of the Power Holst as Exhibited on an tire-Five-Ten Truck with Damping Body,

engine bearings, and by splants. The carburetor is a final feed automate, type thas will deliver a uniform gas at all times. The ignition is jump spark by a Bosch high-tension magneto with fixed spark. There are but five witers, four to the spark plans and the other to the switch, and those leads are encaded to protect them against wear and saturation by labricant or maistance. The attention to the ignition system is multiplicated.

The Hele-Shaw multiple disc circth has 28 diese and these are contained in a case that retains a sufficient quantity of sperm oil so that the diese are constantly Inbrivated. The clurch engages without harainess and it may be alipped continuously If desired without damage. The transmission is so designed that the gears are in mesh at all times and the speed ratios are severed by the movement of dog clutches between the gears. At high speed the gears are all idle. It is Impossible to strip the gears. The speeds are three forward and reverse, with a maximum of 14 miles an hoar, this being intuited by the governor.

The jackshaft is with shafts 1.75 inches diameter and it is mounted on Timken roller bearings, that may be adjusted for wear, and which take the end thrust. The bearings are carried in the steel housing of the jackshaft. The drive is by double side chains. The artis are locally steel drop forgings, the wheel spindles being fitted with Timken roller bearings throughout. The wheels are 36 inches diameter, with 36 by five-inch solid time forward and 36 in four-flucts, dual, ear. The chassis frame is a heavy steel channel section, with strong reinforcements. The springs are 45 inches from a 45 inches rer, intell'edipter, with the spring botte case hardened and fitted in tronze bashings. The wheelbase is 125 inches and the trons 6 inches.

Control is by a vertical steering wiseel with clatch and service brake pedals and a foot accelerator, there being no throttie jever. Side jevers operate the transmission gearset and the emergency brake. The service brake has bands contracting on drums i4 luches diameter and three inches face on tackshaft, and emergency brake has shoes that expand within the 20 inches diameter on the rear wheels. These brake shoes are faced with Non-Burn. The gasoline capac-By is 20 gallons with the tank under the driver's seat, and beside this is a separate tank that will contain two gallons of oil, the contents of which may be supplied to the motor by turning a petcock. The driver's seat is covered by a standing canopy that is supported by stanchlons from the back of the seat and the radiator frame. The radiator is mounted on springs to nullify vibratory influences and it is protected by installation behind the strong front frame cross member. The dash and tail lamps are lighted from a storage battery.

Kochier Delivery Wagon.

Of the delivery wagons of small capacity the Koehler machine, 1600 pounds capacity, was especially noticeable for the series of innovations, all of which had been comblined with a view of obtaining extreme economy and endurance with midinium maintenance and upkeep cost. The chassis differs with present practise in that the motor is carried in a frame amidships, under the body floor, but it is accessible from the sides or by a trap in the body floor, while the position makes a very low centre of gravity, a condition of maserial importance in thre endurance. The purpose has been to produce a machine of low cost that would have moderate expactly and could be operated chaspity, the idea being that there was a large field for a vehicle that would be excreteable for light delivery and have such speed that it would be useful under practically all business conditions.

The engine is of the opposed type, with cylinders hasing bore of 5.25 inches and stroke of four inches, the power rating being 22 by the S. A. E. standard formula. The water jackets are large to secure efficient cooling under continued operation, they being cast integral with the cyl-Inders. The rylinders are bored to size and ground and lapped to a finish. The pistons are turned, ground and lapped to size and, with the piston rings, are fitted with much care to secure complete compression. The crank case is large and is designed with a view to obtain unusual inbrication. The engine has two main bearings, the forward one being 3.5 inches length and the rear 4.5 inches length, or a total of eight inches. The crankshaft is nickel steel, 1.875 inches diameter, with the crankpins 2.5 inches length, and a five-luch flange drop forged integral with the shaft. To this flange the flywheel is bolted. The connecting rods are of bronze, cast with a deep channel extending the length. The wristpins are of steel, ground, hardened and lapsed. The camshaft is forged of tool steel. with the cams integral, and this is hardened and ground to a finish. The hearings are of the best babblu metal throughout. The valves are 2.25 inches diameter, are mechanically adjustable and are interchangeable.

The cooling is by thermosyphon circulation of the water through the larges water Jackets of the engine and the eilular radistor. Contrary to conventional practise the water infet and outlet of the radiator are at the base, so that the heared water entering the radiator mays free through the coolest of the fluid, quickly reducing the temperature. No matter to what extent the water in the radiator may be reduced it will be circulated and cooled so long as there is a sufficient quantity to fill the water Jackets and the pipilox system. The radiator is large and is suspended on helical sortings to eliminate vibration.

The Inbrication of the engine is force feed and splash in combination. There is a considerable oil reservoir in the base of the crankense from which the oil is drawn by a gear driven pump and circulated through tubes, where it is delivered in streams into the channels in the beyone con-



Serent Discharge of the Morgan Truck as Seen at the Bottem of the Hopper-Shaped Botts, Power Being Furnished by the Motor.

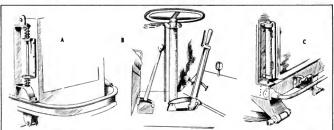
243

necting rods, through which it is distributed to the wristple and crankpilo bearings, and to the main bearings. The cambaist bearings, cylinder and piston walls, and the timing gears, are burbricated by splanb. The old is filtered as fudrawn from the reservoir. The ignilion is by Bosch magneto located on top of the engine case that is driven by enchanced gears. The carburction is by a float feed automatic

The flywheel is mounted on the flange forged en the crankshaft and the engine is installed on forged steel hangers, so that it may be dropped out of the chassis very quickly and easily. The engine shaft is extended, with a single universal joint, to a combined transmission and jackshaft that is installed transversely in the chassis. The jackshaft case is a heavy oil-tight casting in which the juckshaft is mounted on very large journals. The transmission is planetary, all gears being of hardened chrome nickel steel, the shafts of hardened special alloy steel, ground to size, with hearings of phosphor bronze in semisteel casings. The clutch hands for the low and reverse speeds are semi-steel, which cannot slip or burn, and the high speed clutch is a cone. The entire transmission is driven in an oil bath. The drive is by double side chains to sprockets on the rear wheels. The closeness of the are fitted with solid rubber tires, two inches width. The wheelhase is 86 inches and the tread 55 inches. The drive is at the left side and the reverse and low speeds are controlled by pedals, with bink speed clutch and the emergency brake operated by a sincle lever at the right of the driver. The fuel tank of 16 gallons capacity and the oil tank itolding a gailon are located under the altiver's seat. The maximum speed is 16 miles an hour. The weight is approximately 2000 pounds. The maker is the 1, E. Schlotterback Manufacturing Company, Newark, N. J., for the B. J. Koehler Sporting Goods Company, New York City.

Poss Designed by Renault,

The Poss motor waxon, made by the Poss Motor Yompuny, betroit, was destined by Louis P. Resault, a French engineer of large experience, and it has in the engine a combination of qualities that are claimed to afford annusual power and longevity. The vehicle is friction driven, and simplicity and accessibility are features impressed upon the observer. The motor has four cylinders, cast on bloc, with hore of 3.5 inches and stroke of 4.75 inches, and is claimed to deliver 2.5 horsepower with 1200 resolutions. The water jackets are largest at the top and, with the exhaus manifold, are cast integral. The water latake is 2.5 inches diameter. The feet header is internal with the blocks to that the



Studied Simplicity and Stability (A. Kochter Radintor Suspension and Protection by Forming Chassis Frame with Side and Forward Members of a Single Piece of Metal) B. separated Speed Change and Henke Levers of Clark Trock; C. Forward Spring Suspension, Hadinger Larger and Protector of Clark Truck.

spin-kets materially reduces the length of the chain required

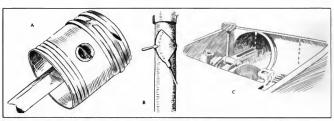
The chassis frame is 1° sings, with the curved end at the front, swert is extend considerably beyond the radiator, forming a solid and serviceable protection against damage from contact with an obstruction. This frame is with the cross members besides the enkine and the jackshort supports, being minimally stiff and strong. It is carried on semi-cliptic springs forward and full elliptic springs at the rear. At the forward end of the chasis, dissprings at the rear. At the forward end of the chasis, distree its behind the radiator, is a cast metal footboard, which is behind to the frame. Cast integral with this footboard is behind to the frame. Cast integral with this footboard is the base for the vertical steering column, the brackets supporting the chetch, brake and brake pedials, and the throattie linkage. The footboard stiffens the frame and makes certain the stability of the assembly. The selecting gear in of the bevel pinion and sector type with a 16-linch hand where.

The from axle is a single steel forging 1.5 inches square, with the knnckle yokes integral. The rear axie is to inche square, forged from steel. The service brake operates on the Jazkabaft with braking surface of 75 square linkes, metal to metal surfaces. The emergency brake is on drams on the rear wheels. The wheels are large and

broming gas is heated by contact with the heated walls and cardination is perfected. The water outlet manifold extends the length of the top of the exhibiter block and has a main outlet with a Y with outlets 1.75 Inches flameter. The manifold is attached to the block by four study 3.75 linch dismeter. The study are threaded into pluge that are in turn threaded into the block, gaskets insuring a perfectly tight fit. The fuel manifold is unusually direct and fuel is unformly fed to the cylinders.

The englise block is yest from xxys tron, and being of the T-type the valves are at the right sets. After botting the block is used and then reamed and ground to size. The pistons are of the same material and are similarly treated in the making. They are fitted with three 25 fast rings and the piston with a propose that is defilled at intervals of sat degrees, through which off rottered by the trung is drained through the piston walls into the engine case. The engine case is a barrel slooped casting with the front when and the oil reservoir integral, there being a bottom plate that may be removed to afford access to the connecting role barrings.

The crankshaft is a two-bearing type with bearings two inches diameter, the forward bearing being three lachea length and the rear bearing four inches. The shaft is of



Mechanical Refluements: A. Mercury Piston with Wristpin Retained by Brass Pin Straightened in the End, Pirmly Fixing the Pin to the Wally B. Garbarctor Air Valve Control on Dayton Steering Columns C. Mechanical Oil Feed to the Connecting Rod Channels of the Koebler Motor.

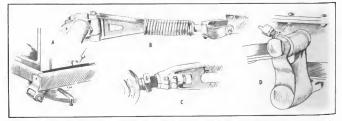
carbon steel, double heat-treated to insure strength. The crankiph hearings are 5.915 inch diameter and 1.521 inches length. The bearings are the best grade of nickel babbit. The timing gear is keyed to the cranshaft. The forward main bearing in pressed and pinned hito the forward web of the crankese, and the rear bearing is pressed into a removable plate fastened with eight 5-linch cap screws. The crankshaft is offer, 3.75 linch.

Perfect alignment is obtained by the method of installing the bearings. Plate eight by 10 linelses at the bottom of the crankease permit work on or examination of the male engine bearinss. The camehatt is a carbon sized forging with the came integral and the three bearins, are 1.75 linelses dlameter and the forward bearing, flanged to receive the timing zeor, is three linelse in length. The centre and rear bearings are one and 1.4375 linelses length, respectively. The bearings are glosspher bronze and are adjustable for end play by a hardened sivel washer and an adjusting lock out. The came have a 3.25-5-linel flange by four. 3.75-linel body, wired to prevent slackening.

The vaives are 1.75 inches diameter, with cass from heads electrically weided to stems, 4375 inch diameter, sit isches length and hardened at the ends. These operate in guides 2.625 inches length. The stems are slotted to receive the key retaining the large springs. The tappet rods are of tool succel, hardened and ground, 1.275 inches diameter warning face, the upper end tapped for an adjusting screw into the head of which is inserted a gray fibre disc to eliminate noise. The rods are operated in .75-inch bronze bushlings, with oil growes to prevent lubricant works.

ing our above the bushings. The connecting rods are lestion drop forgings, 9.5 lacks from centre to centre, wit oil holes drilled to the crankipin hearings. The crankfalf is is removable from the era of the case, the cambain from the from. The timing gears are steel for the crankfalf, and iron for the cambainf and the magneto driving shaft, having inch faves. These are housed by a cover attached to the forward web of the came.

Lubrication in by splash from a constant level in the base of the engline case, lare powers supplying the crash-shaft and camushaft bearings, the oil level being automatically minimized by feed from a reservorle caral lateral with the crankease. The cooling is by thermo-syphon circulation of water through the water packets and the radiator, radiation being premoted by a fan driven from a putley monitorial production of the control of the production magneto with a lixed sports, the magneto being carried on a bracket and talectar with the engine case. The carbureton is by an automatic floot feed carburetor. At there is a millimum of withing and as the valve seems all tappets are enclosed by plates that are removable by sincel auts, the engine is nanusally simile and clear.



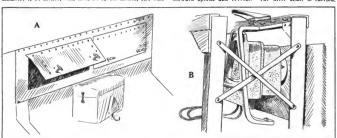
Spring and Torsion Rod Detailet A, Steams Forward Spring Horn: B, Velle Radins Rod and Adjustments) C, Steams Provi sions for Radius Rod Adjustingt D, Forward Shackle of Velle Rear Spring.

member, and shead of a second cross member, is the jack-th as shaft, carried in heavy bearings. On this jackshaft is the driven wheel with a fibre face, that is moved transversely of on any position, affording all the ratios of space pocular to roller or friction transmission. The drive from the jack-shaft to the rear rate, which is of the semi-floating type, is a shaft to the rear rate, which as the part of the semi-floating type, is a single chain. The rear rate is 1.373 inches diameter extended by a tube 2.75 inches diameter, the different entitial assembly carrying the sprocket. The rate is supported by two trans rods, 4.255 inch diameter and the axie relation is maintained by two steel radius rods .75 inch diameter, and cored to the rear spring sandled:

The chassis frame is a pressed steel channel section 135 lacks length and with the two cast steel motor supports there are seven cross members, with triangular gussets at the rear end. The springs are semi-elliptic, the forward set being 36 inches length and 1.75 inches width, siz leaves, perched off centre, with 20 inches spring length behind the axie centre. The rear springs are 45 inches length and two inches width, of nine leaves, shacked front and rear to eliminate driving stress. The front axie is a steel tube two inches diameter with drop forged circles steel knuckes electrically welded to it. With pneumatic tires the wheel diameter is 34 inches, with threa 34 by 35 inches, and with

radiating surface of the motor is unusually large. The camabal is mounted directly above the crankshatt, the cama being very large and contacting with large flanges on the ends of the valve pushroots. The valve stem guides are large and long, and instead of the usual helical spring the valves are operated by heavy springs with a single coil and ends spreading between the guides and the keys in the slotted valve stems. This removes the springs so far from the heat of the cylinders they are not affected. The crankshaft and camabaft are large in size with generous bearings, and the connecting rods are ample in proportions. The ignition is by a storage battery and dry cell battery, coil and timers.

The engine is lubricated by mechanical force feed to the main and connecting rod bearings, and by splash to the cambaft, cambaft bearings, timing gears, valve pushrods, writiplins, cylinders and pistons. The radiation is by a forced draft of air caused by the fan blades of the flywheel. The carburetor is a foat feed instrument made by the Mercitry company. The transmission case is bloided to the engine case, this making a unit power plant. The gearset is planetary, with disc clutch, all clutches and direct drive being secured through the use of a single lever, giving two forward speeds and reverse. The drive shaft is carried.



Fonvenience and Projection Considered: A, Tool Box Located in the Top of the Dash of Dayton Trucka; B, Saspension of the Ammeter in the Walker Delivery Wagon, Permitting Instant Removal.

solid tires the wheels are 36 inches diameter, with tires 36 by 2.5 inches.

The control is from the right side by an irreversible steering gen of the worm and split nut type, with a 16-inch wheel. The tiebar is before the front axie and is 75 inch diameter. The clutch is operated by a pedial, the shoes of the internal expanding type being within drums on the ror wheels 12 inches diameter and 2.5 inches face. This brake is equal-zed. The speed is changed by a hand lever. There is a throttle hand lever on the top of the steering column. The wheelbase is 96 inches and the trend 55 inches. The capacity of the waxon is 1000 pounds. Under ordinary conditions three types of bodies are furnished with the chasks.

Mercury Delivery Wagon.

The Mercury delivery wagons, made by the Mercury Manafacturing Company, Chiego, Ill., are of 1600 pounds capacity. These are a type intended for hard service and to be operated with economy. The engine is with two cylinders opposed, mounted horizontally at the forward end of the chassis. The cylinders are cast with the radiating flanges integral, having a hore of 4.25 inches and stroke of four inches. The offset of the cylinders is 2.125 inches. The rating is 15 horsepower by the 8. A E standard. The

with a single universal joint, through a stout tersion tube to the jacksbaft and differential assembly. The Jacksbaft housing is large and there are liberal bearings. The drive is by double side chains to sprockets on rear wheels, mounted on a dead axle.

The construction is such that the motor may be easily removed for work. The moving parts are enseed and are operated in oil boths, being thoroughly protected from road accumulations. The chassis frame is of armored wood and is strongly reinforced. It is suspended on full elliptic springs, forward and rear. There are two sets of brakes, with internal expanding shoes faced with Thermoid, operated within drams on the rear wheels. The wivels are artillery type, 38 inches diameter front, and 40 inches diameter rear, with 1.73-inch solid tires on standard rims. The wheelbase is \$5 inches and the tread 56 inches. The single lever operates the transmission, and the service and emergency brakes are actuated by foot pedals. The steering column is titting and is located at the right side.

New Mora Design,

The Mora delivery wagon, made by the Mora Power Wagon Company, Cleveland, O. has 15on pounds capacity. It has a horizontal opposed mo'or with bore and stroke of 4.5 inches, the cylinders being cast with the ligrac water.

jackets integral. The rating by the S. A. E. standard is 18 horsepower. The water is circulated through large hose connections and an ample radiator by thermo-syphon movement of the fluid. The radiator is of the aquare tube type, and a carfat of air is forced through it by the movement of the fan-bladed flywheel. The ignition is by a low-tension magneto and transformer coil, with a dry cell battery for starting and reserve. The lubrication is by mechanical force feed and splash, affording a liberal supply of oil under all conditions of operation. The mechanical oiler is operated by an eccentric on the cambaft and is located on the dash in sight of the driver. The carburctor is a float feed type, automatic in its action.

The driving system is carried through a mainshaft, with two universal joints, and to the transmission, which is located just forward of and bolted to the tackshaft housing. The assembly is such that the clutch, transmission and jackshaft are practically a unit. The transmission is a planetary type with the high speed clutch of steel discs. The gears and clutch operate in a bath of oil. In the jackshaft the differential is mounted on annular ball bearings, with outer ends being carried on large roller bearings. The drive to the rear axie is by double side chains. The chassis frame is of pressed steel channel section with six cross members. It is strongly braced and reinforced. This is carried on semi-elliptic springs. The chains are adjustable by the I section distance rods. The axies are special steel forgings, 1.5 inches square. The wheela are 36 inches diameter, with tires 36 by two inches forward and 36 by 2.5 inches rear.

The control is by an irreversible steering wheel located at the left side. The control is by pedals operating the low and reverse speeds and the service brake, and hand levers actuating the blick speed clinich and the emergency brake. Both brakes are an expanding type with shoes having 2.5-loth brakes are an expanding type with shoes having 2.5-lightline and throttle levers are mounted below the wheel limition and throttle levers are mounted below the wheel on the steering column. The gasoline capacity is 12 gallons. The speed is 15 miles an hour. The chassis is furnished with shandard express and stake type bodies.

The Ford Delivery Body.

The Ford delivery wagon classes is the same as is built for the Ford touring cars and it is equipped with an enclosed body with weight capacity of 700 pounds. The driver is protected by a long extension of the top that extends beyond the dash, and by half sides, which permit him to see bebind without difficulty should this be necessary. The drive is at the left and the control is the same as with the well known pleasure vehicles. The maker is the Ford Motor Company, Detroit.

Stanicy Steam Wagon.

The Stanley delivery wagon chassis is practically the same as is built for the seven-passenger outring cars, its power plant heling a 30 horsepower boiler at a steam pressure of 125 pounds, this type being of the same capacity as were installed in the famed Stanley racing cars. The engine is the standard Stanley construction. The wheelbase is 136 inches and the 36 inches diameter wheels are fitted with 4.5-incb pacumatic tires. Resular equipment is a standard express body and a passenger body seating 11 persons braides the driver. These are produced by the Stanley Motor Carriage Company, Newton, Mass.

Mais Is Little Changed.

The Mais delivery wagons and trucks were shown, these being without change, but noticeable for the internal gear drive at the rear wheels. Extreme endurance is claimed for these driving gears by the maker, the Mais Motor Truck Company, Indianapolis, Ind., It being maintained that they may be driven a million miles. One of the features of this machine is the governor which automatically controls the speed and cannot be tanspread with. The treat is 58 inches.

this being two inches wider than standard to prevent driving in car tracks and unnecessarily wearing the tires.

The Mais construction embodies distinct variance from conventional practise, there being the unit power plant, with the motor having four-inch bore and 5.25-inch strok, so designed that it may be quickly removed from the chasis and replaced by another in the event of need. The stransmission is automatically locked so that the gener canot be shifted until the clutch is disengated, and no lic experienced driver can strip or damage the gears. The brakes are nunually large, affording better protection in conceated traffic and on hills. These brakes are positive in action and are easily adjustable. The drive is at the left hand, another quality making for easy control. When the requirements of the purchaser are known the gear ratio is determined and the governor is adjusted so that there can be no abuse of the machine.

Another claim is the economy of maintenance and upkeep. The frame is exceedingly strongly constructed and the drive is such there can be no strain upon the driving sitem, it all being taken by the dead rear axis and the unusually large radius rods, which centre just bebind the forward universal joint of the drive shaft. Four of these machines of 3000 pounds capacity, were recently delived to the United States War Department for service at Fet Leavenworth, Kan., for ambulance work.

Martin Tractor.

Aside from the service wagons exhibited there was shown the Martin tractor, which was included in the exhibit of Knox productions, with it being displayed a trailer win two large wheels with atcel tires and an open-end body loaded with long immber. This was demonstration of the possibility of hauling building material that could not be loaded on a truck

Fire Apparatus, Etc.

There was an interesting display of fire apparatus, including five chemical hose wagons and two pumping engines. Of the combination wagons one each was shown at the Bulck, Pope-Hartford, Keily, Knox and Locomobile stands, and the latest Knox fire pump and the imported Sanrer fire pump. Of these the Buick was a light wagen equipped with a small chemical tank and small hose. The other apparatus was of the type known as combination, combining the functions of the chemical engine and the hose wagon. The creations were all the most recent and decidedly advanced as to construction, arrangement and equilment. The Knox fire pump has a 90 horsepower motor. six cylinders, and a large piston pump with 900 gallons capacity a minute. The Saurer fire pump is 60 horsepower and is rated at 900 gailons a minute. The Saurer apparatus will hereafter be built at Plainfield, N. J. These machines came in for a great deal of attention and the show was visited by a considerable number representing communities. a number of orders being taken for vebicles similar to those shown. The fire pumps are adapted for the service in cities where the buildings are lofty, but the chemical wagons are intended for use mainly in suburbs and residential towns, where economy of time is more essential than large fire fighting capacity.

Ambulances were displayed by the General Vehicle Company and the Autocar Company, omnibuses by the Atterbury, Autocar, Kelly and Stanley exhibits, with a Kelly sightseeing wagon and a Knox patrol wagon.

Refinement of Details,

With every exhibit there was noticeable refinements and attentions to details that demonstrated that each designer bas considered the chassis construction with a view to lissifing endurance and strength and at the same time sufficiency every condition that would convenience work and result in time economy. The Grabowsky, the Sandusky and the Garford machines are so constructed that the motors.

may be withdrawn from the chassis, the Sandusky without removing the radiator. With the others it is necessary to take off this member. The entire unit power plant is withdrawn with the Sandusky, but only the motor with the other two

The radiator is mounted on spring supports by a large namber of designers, this insuring against leaks that might be caused by rigid installations. The majority of the designers has constructed radius rods that are adjustable to compensate for the wear of the chains, otherwise known as stretching, and the manner in which cleb problem has been worked out in indeed distressible. With some of the trucks, as in the Locomobile, the Jackshaft is mounted on spherical bearings, in glimbal, or in other construction so that the Jackshaft is not affected by the distortion of the frame from road shock.

Chain cases are another detail that has received much careful study, these being designed to be oil and dust titch so that with occasional cleaning and replenhabing of the grease there ought to be but little need or attention. The design of radius rods has been improved as a rule, thosebeing beavier and with means for accurate adjustment. In several insances, notably with the Velic trucks, these arconstructed with a pringh puller to absorb the shocks from road obstructions. The chassis frances are heavier and more strongly bareed and in the Stearns truck, with a view to eliminating the stresses from witherline the motor has been mounted with the sub-frame carterid in springs.

Because of the heavy duty required of the springs some designers have made hangers sharper in euroy and deeper, to minimize possibility of striking when compressed to a limit, and to obtain freer action. Spring sharkels shave been very generally bushed with bronze and the spring bolts provided with means for lubrication. Brakes have been made larger and with equalizers to insure positive and certain action.

The placing of the tool lox above the radiator in the dash before the driver ba convolutione that can be appreciated by those who have been forced to search under a sear or elsewhere for tools that are absolutely necessary for the simplest adjustment. Another lustallation on the same machine is a little hand lever in a quadrant on the streeting post by which the gasoline subjet may be varied when there has peed of giving the motor more fuel, such as during a hard climb or where the work is extremely hard, this being necessary with a long stroke more

The Mercury platna construction was noticeable for the simple manner in which the wristpin is retained. The channel in the boss for the existpin is bored and at either side a small revers is made. The ends of the hollow wristpin are cut with a semi-circular reverse to correspond with than in the side of the boss. The wristpin is placed with the recesser existering and then a brase pin is placed with the recesser existering and then a brase pin is placed with the religion in the side of the place of the property of the place of the place in the walls of the platon and there is to inpossibility of the wristpin becoming loose, and the brase will not severe or damage the walls of the cylinders. The process is interpensive and the construction is regarded as being satisfactory, mechanically.

EDISON STORAGE BATTERY LETTERS.

Some 18 months ago, the Edison Storage Battery Company, Orange, N. J., becam, additutetive contentional criminalign in the Army and Navy Journal, in which Miller Reese Hutchinson prepared a series of 52 letters, explaining in simple and non-technical language the methods of construction and operation of the Edison storage battery for commercial and pleasure vehicles. Those who have had

opportuality to read but one or two of these letters have become induced with the highly instructive material embodied therein, and the company has been besieged with inquiries as to how the full set might be procured. So institent has see he had been this demand that the Edison company has prepared, in reprint form, a neath bound volume, over 100,000 copies of which have been distributed aiready. The letters are replete with information concerning this remarkable product and the treatment is such as to meet with decided approval by the general public. Mr. Hutchinson has been engaged to prepare a new set of letters, which will appear weekly in many journals throughout the country, and it is anticipated that they will be received in the same manner as his initial effort.

NEW VELIE DUMPING BODY.

A new type of dumping body has been brought out by the Velle Mortor Vehiele Company, Molline, III, one of which has been fitted to a three-ton Velle truck and is being demonstrated by the Boston branch of the company. In the accompanying illustration is depleted the design and it will be noted that the carrying receptacle has been elvated and swung to the desired position by means of a roller bearing terratable.

This arrangement not only facilitates the unloading of



New Yelle Dumping Hody Which May the Elevated to Any Youle and Swang in a Circle by Menus of a Turnishle.

coal, sand or brick, but eliminates wear and tear on the machine. Many times the driver will back up to and over the sidewalk to get his load into proper position for dumping. This creates considerable damage to the lires as well as to the mechanism of the car.

The new body is mounted on cross sills, these being attached to the upper part of the turntable mechanism, which is so constructed that the load may be aware, easily to the desired flocation. The carrying receptacle is relevated to any angle by means of a hand operated sinch. One of the object is the features of the designs is that it does not obstruct tractific in the atreet as it is parallel with the road and the side-walk and does not extend thou the forpret.

PENSACOLA ADOPTS MOTOR SPRINKLER.

in Penacola, Pla., the warm climate makes it necessary that the streets be sprinkled frequently. The authorities decided recently to dispense with the horse drawn equiment and placed an order with the Autocar Company of Ardmore, Penh., for an automobile on which will be installed a cylindrical tank capable of carrying 300 gallons of water. The container is to be finied to one of the commercial chasels and will be mounted upon silts to distribute the load evenly.

NEWS OF THE COMMERCIAL VEHICLE INDUSTRY.

Sells Taxicab Business to Develop Motor Omnibus Interests Along Broader Lines---New Companies Organized and Old Concerns Increasing Activities.

Changes in the taxicab situation in New York City havebeen predicted freely during the past year, and while many of the reported combinations and readjustments have failed to materialize, it is interesting to note that the New York Transportation Company has sold its taxicab business to the Connecticut Cab Company of that city. The purchasing company will take possession June 1, adding to its already well equipped line, more than 600 cabs, the stations and good will of the former concern. The statement of W. R. Meade, president of the New York Transportation Company, in this connection, follows:

"Since the adoption of the motor omnibuses on Pitth avenue, that branch of this company's business has developed with amazing rapidity. We have for a long time feith encessity of cuncentrating our efforts on the Pitth avenue omnibus line, for the benefit both of the atockholders and of the public. Such concentration was manifestly impossible with the attention of the board divided between the omnibus line, the taxicab and livery business.

"On the other hand, we awaited an offer for our taxicals and livery plant from a concern that should not only be advantageous to our stockholders, but that should come from an organization able to maintain the high standard of service which our taxicab customers have come to expect from us.

"While I do not care at this moment to go into particulars as to our arrancement for the development of the Fifth avenue omablus business, I am willing to say that the improvements made there will, we hope, within the next few years be even more important and noticeable than the change from horse to omnibus traction. The advantages, both to the stockholders and to the public, will be marked and important.

TO PRODUCE PARCEL DELIVERY VANS.

The growing Importance of light delivery vehicles has brought out a number of new concerns for their manufacture during the past few months. Among the latest is the Manistee Auto Company, Manistees, Mich., which has been organized by seven local men with a capitalization of \$51,000. Charles Elimendorf is president and general manager, and George M. Burr, secretary and treasurer. Suitable machinery has been purchased and work will begin in the near future on the reconstruction of a plant at River and Pifft streets, where low priced runnboats and parcel delivery vans will be manufactured under the present plans.

WOULD LOCATE IN SPRINGFIELD.

It would appear that Springfield, Mass, is to become an important distributing centre for most rucks, if the reports from that city are verified by subsequent developments. It is announced that representatives of the General Motors Truck Company were in Springfield recently, seeking to interest local capital in the organization of a company with capital of \$3.00,000 for the erection of a motern distributing plant, which should have charge of the disposal of the product of this concern in the New England states.

According to this information the representatives interviewed officials of the Morse-Readio Company, a local

concern engaged in the manufacture of pleasure and commercial lines, which has been contemplating the construction of a new building on the east side of Dwight street. The proposition is said to have included a comhanton between the two companies in the organization of the distribution concern.

With the weatern men were two floaton architects who exhibited plans for a six-tory structure, the first floor of which was to be utilized as a large automobile supply store. The second and sixth were to be reserved for the distributing business of the new company, the third for pleasure vehicles, with an entrance from Chestinut street, and the fourth and fifth for storage purposes.

WILL COMBINE FORCES.

Announcement is made by Henry F. Donaldson and Joseph Tracy, both of New York City, that they have associated themselves as automobile engineers to undertake consultation, research and development work, design and construction, laboratory and road tests. Both mea are well known in the industry, Mr. Donaldson being president of the Society of Automobile Engineers, and Mr. Tracy a consulting engineer of wide experience. For the present, headquarters will be maintained in the office airready established by Mr. Tracy at 118 West 39th arreet, and the laboratory in New Jersey will be retained.

EXPLOITING CINCINNATI TRUCK.

The drawings, patents, equipment and material belosting to the Power Car Cumpany of Cinclinanti, O, nave been purchased by a concern to be known as the Cinclinanti Molors Company. The new owner will be incorporated in the near future, and will take immediate steps to place in the market the car originally designed by the Power Car Company, under the name of the Cinclinant truck. Those bebind the movement include Pranklin Alter, Harry T. Alter and J. B. Doan, all of Cinclinanti.

TO PRODUCE CARS IN ST. JOHN.

1. A. Puggley of J. A. Puggley & Co., St. John, N. B., was a visitor at the recent lesions show for the purpose of interesting capital in an effort to locate an automobile factory in St. John. It is understood that he was more or less auccessful and plans are under way for the erection of a plant, in order that construction work may be begun with at least 500 workmen in the early summer. Besides pleasure exits, the new concern will specialize in the construction of taxicabs for which there is said to be an unusual demand in New Brunewick.

ENLARGING CHASE PLANT.

Construction work will start in the near future on an important addition to the plant of the Chase Motor Track.
Company, Syracise, N. Y., maker of Chase commercial vehicles. The business of the concern has increased materially as the result of recent shows in various parts of the contry, and many of the new orders call for special bodies or standard chassis. In order to handle this extra work in additional story will be added to the main building.

COLORADO WOMAN BECOMES TRUCK MAKER

Probably the Brat woman in the country to direct the production of unitor vehicles, no matter what the type, in Mrs. Nettle C, McIntre of Degree, Col., who is not only the erganizer but principal stockholder in the Wichita Palis. Manufacturing Company, Wichita Palis, Tex., maker of the Wichita Palis turk. Mrs. Mentry is a practical business woman, who has had large experience in other lines of endeavor, and ber interest in the manufacture of commercial motor vehicles is due largely to the fact that she realizes the importance of this type of transport in solving many of the difficult problems of modern haulage in all sections of the country.

Until recently her home was in northern Colorado, While on a bissiness whit to Wichtig Palls site became directly interested in a unit control of spark, throttle, clutch and transmission, invented by C. A. Belkiernan of that city, She believed that this feature would be particularly applicable to motor trucks and enlisted the financial support of J. A. Kemp and Frank kell, 10th of Wichtig Palls, in her project,

As a result of her endeavors the company was formed and a few vehicles of one and two tons produced in time to be displayed at the recent Kanssa City show. Their success seems to be assured, from the fact that orders for 25 machines were secured during the exhibition.

The Wichita Fails truck was next displayed at the Denver show last month, and proved to be one of the client attractions at the so-called Rocky Mountain district exhibit. The Wichita Fails Motor Sales Company has been organized in that city to look after the retail business in Denver and vicinity.

DECATUR TRUCK IN NEW HOME.

The Grand Rapids Motor Truck Company, which is the new name of the beatury Motor Truck Company, maker of Decatur "Hoosier Limited" vehicles, is now located in its new home on North Front street, Grand Rapids, Mich. by from the old plant in Decatur, Ill., is being installed as rapidly as possible. The change nowise affects the mechanical construction of the car, which has made such an envisible record daring the past year that enlarged facilities for production were absolutely important or construction of the car, which has made such as envisible record daring the past year that enlarged facilities for production were absolutely importative.

The new company is capitalized for \$600,000, and among the additions to the directorate are several prominent business men in Grand Rapids. M. E. Brackett remains at the head of the organization, and it is understood that the general policy of the company will be unchanged, except in the matter of greater production. In other words, the change was made solely for the purpose of breadening operation.

RECIPROCITY IN NEW JERSEY.

After once deciding by a majority of two votes that it would not adopt the suc-alled reciprocity measure, the Senate of New Jersey changed its mind, and the bill now awaits the signature of Goreenor Wilson. Of chief interest to the owners and operators of motor trucks is the provision of an additional fee of \$10, over and above the registration fee which is based on horsepower rating, for commercial vehicles weighing unloaded more than 1000 pounds. This section is hased on the contention that heavy freight vehicles wear the roads much more than other types. The reciprocity portion of the act follows:

"Any motor vehicle belonging to any person who is a non-resident of this state and who has registered such motor vehicle and has compiled with the law of the state, territory or federal district of the l'nited States in which he resides with respect to the registration of motor vehicles and the display of registration numbers, and who shail conspicuously display such registration number as required thereby, may be driven in this state during a period not to exceed 15 days in each calendar year, or on two or more occasions not exceeding in the aggregate the period of 15 days in any such year, without complying with or being subject to the provisions of sections 15 or 21 of the act to which this is a supplement, or either of them, or with any of the preceding sections of this supplement; provided that each day or part of a day during which any such motor vehicle is within this state shall be considered as one of the said 15 days; and provided, further, that the provisions of this section shall be operative as to say such motor vehicle owned by non-residents of this state only to the extent that under the laws of the state, territory or federal district of his residence substantially similar exemptions and privileges are granted to motor vehicles duly registered under the laws of this state."

MILLION DOLLAR ELECTRIC CONCERN.

Articles of Incorporation have been filed with the secretary of state at Albany, N. Y., by the Buffalo Electic Vebicle Company of Buffalo. The capital is stated to be \$1,000,000, of which \$700,000 is to be common stock and \$2500,000 preferred. The company is to manufacture electric bleasure and commercial ears.

The directors named are: W. C. Peuchter, W. J. P. Seipp. Thomas B. Wbeeler, Frank G. Lane and Marcus A. Alexander, all of Buffalo. It is announced that the complete details have not been worked out, but it is expected that the company is to be a merger of five existing Buffalo concerns, not necessarily now connected with the automobile industry.

WILL MAKE TRUCKS IN TEXAS.

The Twyford Auto Manufacturing Company has been orcanized in Houston, Tex., with capital of 4400,000, for the manufacture of a four-wheel drive truck under the Twyford patents. Nearly 30 arres of land have been purchased at South Houston, this being located on the rallized line and close to the depot at that joint. Work will be in at once toward refitting the building thereon for the production of mechanical vehicles, although no announcement is made as to the number of trees or sile.

The officers and directors include some of the most successful business men in that action, as follows: President, Monta J. Moore, president American Trust Company, Houston; vice president, J. N. Groesbeeck, director Hardy oill Company, Houston; secretary and treasurer, Monta J. Moore, J. H. Houston; superintendent, R. E. Twyford, South Houston; directors, F. M. Robhison, automobile business, Houston; W. E. Richards, president American Loan & Mortzage Company, Houston; W. C. Berry, attorney San Antonio & Arkansas Pass Railrond Company, San Antonio &

FACTORY TO LOCATE IN IERSEY.

While the name of the purchasing concern has not been made public, it is understood that a new automobile factory is to locate in Garffeld, N. J., a title to 15 acres of land in the section known locally as Plauderville, having passed from Matthew Van Kirke 10 August Hensel, who is acting for the real buyers.

JOHN N. WILLYS TAKES OVER GRAMM PLANT.

Undoubtedly one of the most important automobile deals of the past few months is disclosed in the announcement that John N. Willys of Toledo, O., president and sole owner of the Willys-Overland plants and allied interests, has



John V. Willyn, President Willyn Overland Company,

bought the controlling Interest in the Gramm Motor Truck Company. Lima, O., maker of Gramm vehicles. This news comes as a decided surprise to the industry, although it has been known in a general way that Mr. Willys has been casting about for a truck plant that was equipped as he thought It should be to meet the requirements of the commercial car users of America, and particularly of the more than 2000 Overland dealers

The combination

President Wills - appears to be ideal

Company, from many viewpoints.

The remarkable rise of Mr. Willys in the automobile business since he rook over the Ooreland shall be been a subject of much literest both in and our of the industry. B. A. Gramm is without doubt one of the best informed and most experienced truck manufacturers in informed and most experienced truck manufacturers in the most experienced truck manufacturers in the contact the solution of the lody problem, and this feature alone is a business in litered.

The Gramm truck plant is one of the largest in the world, devote exclusively to the manufacture of commercial cars. The buildings occupy 22 acres of ground, and 5.25 acres are under one roof. Twelve bundred men are employed. All of the equipment is of the very latest and best that can be purchased. The automatic machinery is the most modern. The buildings are of steel and reinforced concrete, and are valued is \$1,250,000. No announcement has been made concerning the plans of the Gramm company under the new management.

KELLY-SPRINGFIELD TIRE EARNINGS.

The Consultated Rubber Tire Company, Akron. 0, maker of Kelly-Springfield tires, reports that the net earnings of the company for the year 1911 were \$114,029, as increase of \$25,505 over the previous year. The gross sales for 1911 were \$3,38,35,28, as against \$21,004,915 for 1910. The income account for the two years is shown by comparison as follows: Interest, dividends, etc., \$95,562 in 1911, and \$150,402 in 1910; total receipts, \$24,479,948 and \$2,311,317, respectively; consequence, takes, etc., \$3,35,57, and \$45,515, respectively; net earnings, \$114,020 and \$85,515, respectively.

GOODYEAR BRANCH IN MEXICO

The Goodyear Tire & Rubber Company, Akron, O., maker of Goodyear Ures, has leased for a long term of years a three-story building at the corner of Avenida Juarez and Italderas, Mexico City and the structure is being remodelled to serve as a special factory branch in Mexico. The officers of the Mexican company are: Ulrector general, J. C. Mac-Fadyen, formerly in charge of the company's branch in Indianapolis, Ibid; secretary and treasurer, S. F. Fuller, formerly with the Mexican Clay Products Company,

GRANT TRUCKS IN BOSTON.

The Grant Motor Truck Company has been organized in Boston, with Harry F. Grant, twice a winner of 'text Vanderbill Cup race, as treasurer, and Frank S. Corriew as assess manager. It is announced that the factory will be located in Cambridge, Mass, where a one-ton vehicle will be produced, rapible of earrying at least 50 per cent, cover-load. Temporary offices have been opened in the Sito- κ Leather building, Boston.

AIRLESS TIRES IN ALLIANCE

The Board of Trade in Alliance, O., announces it has procured for that city the plant of the Davies Manufacturing Company of Detroit. The concern produces airless automobile tires, and is incorporated for \$150,000.



Plant of the Gramm Motor Truck Company, Lima, On the Controlling Interest in Which Was Acquired by John N. Willys. Recently,

MULLER POWER CAR AND ROAD TRAIN.

Interesting Application of Mixed Gasoline-Electric System in Hauling Heavy Loads Long Distances Over All Conditions of Road Surfaces.

By Joseph P. Fox.

THOSE interested in the matter of transporting heavy loads through districts where it has been found impractical to construct railroads are aware of the importance of the motor road train, but there have been certain difficulties in the production of suitable vehicles which at first appeared almost insurmouttable. Differing types of power, steam, gasoline and electricity, have been tried, and it has been demonstrated very effectually by experience that the main feature is not so much that of the power generator, but the means for transmitting this power to the road wheels.

The real advantage of the road train lies in the proper division of the weight to be carried over a large number of wheels, and of having as many of these wheels as is pos-

sible act as driving members, thus doing their part in the work of propelling the whole. It is in unity of action that the greatest efficiency of the road train is reallzed.

Even in countries well served by railroads, there are sections. towns and cities lying between and on hills, which in many instances offer splendid opportunity tor the institution of such service as is contemplated by the road train. It is of particular advantage, however, in the transportation of mining products and supplies; timber, stone, cement and other building materials, and in the great food growing centres where quick movement of large quantities of produce is of the most vital importance.

Of course, if the road train is to possess positive operation, suffi

cient to guarantee against extended delays which could cause serious inconvenience or loss. In addition, it must be able to transport goods or material at a cheaper rate than the means for which it is offered as a substitute. It is easy to understand that such a train is confronted by serious handicaps, and among these may be mentioned hills, bad roads, curves and corners, the last named of which must be taken within a comparatively short radius.

in fact, it may be stated that it is in the matter of rounding curves and corners in which the constructor has found the greatest difficulty of all. Each car, or each member of the train, must have the ability to describe automatically the same are of a circle as the leader without any extraordinary skill or particular attention on the part of the driver, other than that usually required in turning corners with a single vehicle. In other words, the entire train must act as a unit. it is interesting to note, in this connection, that a number of road trains have been produced, which have demonstrated their ability to do this. It will be seen that it is necessary that when four wheels are used for each car, they shall all be steering wheels and if possible driving members as well

By dividing the load over a number of cars and therefore over a large number of wheels, it is possible to operate over sandy roads or soft ground without sinking too deeply. If one set of wheels were loaded more heavily than the others they might sink into the path so as to make driving very difficult, if not impossible. Furthermore, a proper distribution of the load insures that each set of wheels shall have sufficient adhesion to the road surface at all times, even though some may be in such position on bad or slippery ways as to be of practically no service for the time being

To obtain the best results, therefore, it becomes necessary above all things to have the best possible means of transmitting power to the driving wheels. It must appear

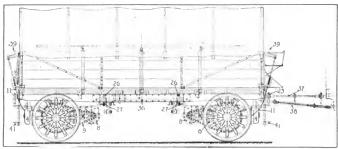


supplant present methods, it must templete Mulier Power I'm with its Double Power Pinot, Elevated Exhaust Pipe, tron

that it hardly would be practical to have a separate power generator in each car, as this would require too much attention and take up altogether too much valuable space. As a result, the trend of design has been confined principally to a central power plant with a simultaneous transmission of power to the various driving wheels

As power generators, either the steam boiler and engine or the gasolite motor may be used, and as a medium of power transmission to the wheels, either electricity, compressed air or oil hydraulics would appear to be better qualified for this work than any mechanical means. Instead of power generators, it is possible that compressed air tanks or storage batteries might be employed, but this hardly would be practical, except for regular trips over short distances and under specially favorable conditions for refilling the tanks or recharging the batterles

The generation of power by gasoline motor and the transmission of this power by means of an electric dynamo and driving motors, seems to have exceptional qualifications not possessed by other systems. This so-called mixed system has been tried with success in the construction of single vehicles, and it must be added that it is as near



Side View of Maller I tillty Car, Showing Relation of Parts and Method of Connecting in Making I p the Tests,

Ideal theoretically as can be imagined, especially with road trains. There is ample space for the assembly of the dynamos and reserve batteries, which do good service as well in lighting the era and in starting the motors. The transmission of energy to the distant cars being by the simple means of a cable, which is not in any way sensible to shorks, twist or or differences of temperature, is an advantage of great importance peculiar to this system.

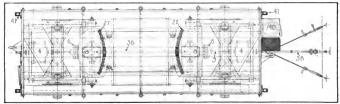
There is perhaps no service for which the trackless train is better adapted than military work, and here this so-called mixed system has been proven practical by severe tests under all conditions and over all kinds of reads. The wonderful clusticity and reserve power, as well as the quick and simultaneous transmission of power to all driving wheels, has made it possible to overcome road conditions that otherwise would seem to be impassable.

The war departments of various European countries from time to time have experimented with the road train, and the encouragement offered to the manufacturers has been of great assistance to the industry. This is particularly true of Germany, which has established an experimental corps composed of what are termed "Gentus Soiderse," for the purpose of thoroughly testing out everything worthy of note which is brought to the attention of the government. Suggestions for improvement and for new construction are made by this department, subadies and prizes are granted to those who have qualified; in fact, everything possible is done by the government to encourage progress along these lines and to keep the war department alreads of the situation. This applies to every line of activity. The road train described herein is that of the firm of W. A. Th. Muller (Strasstrung Geselbechaft) Street Train Company, of Staglitz, near Berlin, and was built especially to comply with the requirements of the German War Inpartment. It is composed of one power car and six trailers, the entire train being mounted on Iron tired wheels. Each trailer, as well as the power car, has two electric motors, each driving a pair of wheels, therefore making each wheel in the entire train a driving member.

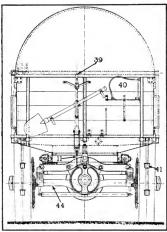
This train carries a load of from 30 to 32 tons, at a speed of 12 to 16 kiloneters (about 7.5 to 10 miles) and hour. The load is divided evenly on the six trailers, making an even pressure on each set of wheels of about 5 tons. The power car carries no load except the power plant and the help necessary to operate the train.

The fron tires have a width of 200 min (about 7.8 linches), so that the loaded trucks are able to travel over soft and sandy surfaces without sinking into them to any extent similient to impete the progress of the train. Through extended experiment than been found by the German government that a train of this type fully loaded can operate up a 10 per cent, grade over soft ground and pathless fields.

An accompanying pase plate presents a drawing of the power car, compriring two exactly similar, complete and independent power plants, each made up of a six-sylinder gasoline motor attached to an electric dynamo, whose anchor serves instead of the endomary Bywheel to steady the operations of the motor. From the two ends of the dynamo shafts, which abut each other in the centre of the car, there



Top View of Mutter Utility Car Channia, Outlining Electric Driving Motors, Switching Trucks, Braking System, Etc.



End View of 1 (01) t'ar, Presenting Position of Brakeman's Sent. Etc.

are two Renold silent chains for the purpose of driving an exciter dynamo. The transmission of energy from the generators to the electric power motors which proped the driving wheels is by means of a direct current which is converted into electromotive force of 400 volts by the exciter dynamos.

The coupling between each motor and its dynamo is by

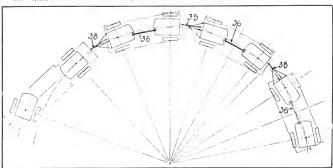
means of a shaft and two universal Joints, which in order to keep the crankshaft and anchor in rigid connection with out the possibility of any play, is constructed especially atrong and of the best possible material. Each six-cylinder motor has a bore of 155 mm and a stroke of 170 mm (5), by 6.7 linches), rated at 39 horse-power at 850 revolutions a minute. The fuel is either 'bencol' or heavy gasoline.

As will be noted in an accompanying sectional view, the valves are assembled in the explinder heads and the lintake and exhaust are on opposite sides. Ignition is of the Bosch make and-break type. Cooling is by means of water circulation through a financed cooler, this being set so low that the fan for supplying the cold air can be driven directly from an extension of the motor cranskalaft. In order to prevent dust from entering the engine room, the front part of this room, under the hood, is partitioned back of the fan in such manner as to prevent the air carriest passing through, but notwithstanding this obstruction, the fan is fully advantage for the resulterments.

That the motor may be started by hand, an opening comprising a sieve and bashing is situated in the centre of each cooler through which the starting crank may be inserted. This sieve and bushing are held in place by a frame extension which holds the cooler in position, and this extension is fastened to the chassis in such manuer that it can be removed easily to permit necessary regalists. As in this assembly the cooler is stationed below the motor, it has been found necessary to arrange a special tank sufficiently high on the dash, within the hood, to allow the excape of any air or steam which might accumulate.

Together with the two complete power plants, the power car carriers 500 illers takon 120 gallons) of feel, and a conspice supply of electric apparatus necessary for the control of the vehicle. In this equipment is included as Edison storage battery of 40 cells, employed for atarring the gasoline motors, through the medium of the main dynamos, which, when thus used, are transformed for the time being into electric motors. This battery also is employed for lighting and for operating electric brakes, one at each road where.

All control levers on the power car, which have to do with the steering or braking of the train, are attached to or near the steering gear, and within easy reach of the



Sketch Illustrating Position of Each Member of the Entire Train White Hounding a Curie, the Power Tracks on Each Car Being Switched on Their Respective Turnsables.

driver's seat. All are in duplicate, as well as being assembled from interchangeable parts.

By reference to the page plate and other drawings herewith, the following figures will better explain the different parts: 1, slx-cylinder gasoline motor; 2, exciter dynamo; 3, main dynamo; 4, electric motor on driving truck; 5, motor shaft; 6, brake operated by magnet; 7, pinion shaft; 8, casing for crankshaft, driving and differential gears; 9, chain for driving road wheels; 10, chain to determine extreme lateral movement of driving truck; 11, Bowden cable for operating the wheel brakes; 12, steering wheel; 13, brake wheel; 14, lever for regulating motor; 15, lever for operating magnetic brake; 16, oil tank; 17, water condust; 18, partition; 19, water pump; 20, ventilator; 21, cooler; 22, sleeve for starting crank; 23, clutch for connecting rod between cars; 24, shaft between motor and dynamo containing two universal joints; 25, worm drive for steering gear; 26, pinion gears operating turntable; 27,



I tillity (or no Seen from the Front, nod Method of Controlling It When Deinched Irom Trate,

twict the quadrant gazz; 28, exhibit for gasoline moor; 22, double sout with tool horse; 30, destric hattery; 32, isostation regulator; 33, furl tank, 31, than driving exciter dynamic 35, electric switch for control of speed; 36, connecting shaft for storing train; 57, connecting roll between case, 38, secretaring pole; 38, crank for operating hand braken, 46, brakenian is seat; 41, step; 42, sacket for plot II intrinsib; 31, terminable supporting track; 43, funding also

The larger drawing in the page plate Hastrates the assectable of the power raw with its double power plant. The front sice alices the set is position of the reoder, water conduit, exciter dyname, set. The first sectional view presents the location of the worm driven steering goar, storage battery, which and course levers. The last view is that indicating the placing of the resistance regulator, chain drive for exciter dyname, cylinder head valves and exhaust.

The double power plant is held not only to possess the



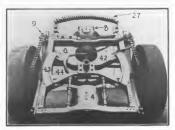
End View of Swivelling Truck, Indicating Location of Electric Driving Maior.

advantage that the train will not be placed out of service because of a defect in one of the machine, but in that it increases the efficiency of the assembly, insofar as that is possible, by operating he train on a comparatively reduced fuel consumption. When travelling over hard level roadsists is claimed that it is possible to hault the train at a normal rate of speed by one motor, delivering only 50 of its 30 horse-power.

The double seat not only accommodates all the help-the necessary for the operation of the power plants, but the necessary for the operation of the power plants, the compartments underneath are so constructed as to be available for earrying tools and the treserve parts that may be required on a long journey. The double steering gears are each composed of a worm divide from the shaft of the average each composed of a worm divide from the shaft of the average plants are in the plants are in the state of the steering shaft and on the upper surfaces of the two trucks, which carry the sailes and diving wheels.

In order to make the turning or secritic of the tracks casy for the operator, the body of the vehicle is supported in its pivoted position by steel rollers assembled on half bearines and resting on tracks supported by the tracks. The curved sector attacked to the end of the track frame, which is driven by the pinton gear above mentioned, is guided between rollers fixed to the frame of the chassis

As shown, these tracks, which are practically the anneating the unity cars as in the power ear, are constructed of a U shaped steel frame supported on the two driving wheels by means of the springs and axle. The track wheels are driven by means of chains, connected by cross slotfa, differential and centre shaft to the electric motor. The cross-



Top View of Switchling Truck, by Menns of Which Every Movement of the Train is Controlled.

and centre shafts are connected in the usual manuer by pinion gears. The shafts and differential, as well as the motor, are enclosed in dust proof cases and suspended from the frame of the truck.

On the shaft of each motor is an electric brake, operated by a magnet and controlled from the driver's seat. Aseach utility car has one of these brakes, it can be seen that with a single movement of a hand lever, the operation is in a position instantly to apply the brakes throughout the entire train.

Within the chain drum of each wheel also is assembled an expanding brake, attached to a balancing member, which may be operated from the brakeman's seat situated at the end of each car. The controlling medium is that of a crank attached to the upper end of a slanted suindle, this suindle having at its lower end a screw and sleve to which are attached flowden cables. These cables are attached are attached flowden cables. These cables are attached to the the balancers of both trucks, making it possible for the brakeman to apply the brakes on all four wheels at the

As a rule, the electric brakes are quite sufficient to control the train, and the hand brakes may be termed emergency members. It is intended that these shall be used only when the electric brakes are out of order, or in case it of connecting a power cable to the car, by means of which it is supplied with power from a stationary storage battery. The car then may be started and stopped, within the radius permitted by the cable, from the brakemañ seat, a lever being provided for that purpose as shown. Sterring is accomplished by means of a wagon pole, easily attached, and this pole also can be used to good advantage in sterring around very sharp corners.

LARGE ORDER FOR PEERLESS TRUCKS.

Throughout the country the leading express companiess are replacing their horse draws equipment with the more progressive form of transportation, and it is interesting to note that the exhaustive tests conducted by the engineers of times concerns have resulted in a favorable report and the adoution of the mechanical transport.

Different size cars were placed in service and operated counterouding conditions more exacting than the horse drawn eight mean. Luring this work they were watched carefully by these engineers and traffic experies who made accurate estimates of the vehicles as compared with other methods of hauling.

The American Express Company, one of the leading or-



Part of a Fleet of Peerless Trucks Purchased by the American Express Fumpany Which Adopted These Vehicles After Exhumilty Tests.

is found necessary to hold a single car that has been switched off in making up or detaching the train.

It has been noted that the power trucks on the utility cars and on the power car are practically the same, the only difference being that in the former the body of the vehicle is supported on the centre pivot and on shoes sliding on the curved tracks which form a turntable, while in the latter steel rollers are substituted for the sliding track. An accompanying drawing shows the entire train as it would aupear while rounding a curve, and it will be seen that the power trucks of each car are swivelied on their respective turntables. Each truck is turned to a corresponding angle with the radius and the curve to be followed. This is accomplished by means of the steering shafts, which are geared so as to turn the sectors of each truck at the same proportionate angle, but in an opposite direction to the one preceding it. These steering shafts are assembled slidably in their sockets or bushings in order that they may be relieved of all shocks or thrusis. Strong shafts with double universal joints attached to spring bearings connect the cars as can be seen in the illustrations. For making up trains or moving the single cars around independently of each other, a very novel plan has been adopted. As shown in an accompanying photograph, this consists merely ganizations of its kind, experimented with the automobile and some time ago placed five Peerless irrucks, made by the Peerless Motor Car Company, Cieveland, O., in service. These were given severe usage and the result was that the company placed an order for 11 more machines. In the accompanying illustration is shown eight of the new vehicles which have been tested out and are ready for the fitting of special bodies.

PUEBLO BUYS NEW PRISON VAN.

Pueblo, Col., which experimented with the automobile police patrol, utilizing a second hand pleasure vehicle, has replaced the machine with a Cadillac to which has been fitted a special hody so constructed that it will accommodate a large number of prisoners as well as officers.

MILTON, MASS., HAS NEW PATROL.

Chief Maurice Pierce of the Milton, Mass, police department has purchased a new automobile police patrol to replace the old vehicle which has been in service for over two years. The new machine provides seating capacity for five persons.

New Emmercial ErAccessories.

Young's Self-Starter.

A device whereby gas lamps may be lighted and extinguished from the seat by the throwing of a switch, in manufactured by A. G. Young, Pittsburg, Penn. The selling agent is William H. Poliock, 607 Webster avenue, of the same city. The equipment consists of a dash vaive which controls the flow of acetylene, awitch and sive, and burners. The last named are fitted with a practical aparking arrangement, so constructed as to withstands hard usage as well as heat. When the awitch is operated the regular current is utilized to lump a spark across the gap at the burners, igniting the gas. It is claimed that the device will save 50 per cent, on gas bills, may be attached in a few mitutes by anyone, and does not require any attention whatsorver.

Providing instantaneous adjustment and a positive grip are the features emphasized of the Pittali wreaches, manufactured by the Standard Wrench & Tool Company, Providence, R. I. The tool is free from adjusting nuts, being constructed in three parts, these operating on the inclined plane or wedge principle. In practise the movable jaw member may sidic forward or backward and when pressure is applied, the tooth block locks the parts securely. They are made in different sizes and in the resultar form, as well as for working on pipes. It is claimed that the only part subject to wear is the tooth block and as this is removable it may be replaced easily, and the member is not expensive.

Vixen File.

The superior abrasive qualities of the Visca file, the product of the Visca File Company, Philadelphia, are said to be due to the peculiar construction of the teeth. These are semi-circular and are cut especially deep. The tool is adapted to soft and tool steel, cant and wrought Iron, bronze, brass, etc., and it is claimed that owing to its self-ceating properties will cut soft metals without clogding, will not slip or chase, and operate equally well on greased surfaces. It is claimed that the Vixon product may be resistanceed from four to six times, this depending upon the

number of teeth to an inch. The files are made in different sizes and atyles.

Hagstrom Spark Plug.

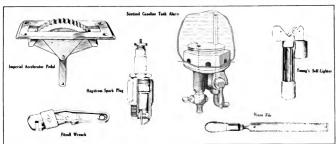
The Hassrom Bros. Manufacturing Company, Lindsborg, Kan, has brought out a new type of park plue, the feature of which is the fitting of a porcelain guard in the shell proper, and surrounding the exposed end of the electrode. It is claimed of this arrangement that oil is prevented from working up into the plug, that the maint porcelain is protected against undue heat, and that short circulus by carbon are climinated.

Wixon Accelerator Pedal.

An accelerator which is operated with the foot in a flat and natural, as well as rehazed position, is being markered by the Imperial Brass Manufacturing Company, Chicago. The device is know as the Wixon and consists of a flat plate for attaching to the floor board carrying a pivorally mounted half-wheel which is provided with teeth designed to prevent the foot from slipping when operating over rough roads. Attached to the wheel is a lever to which is connected the roll leading to the carburstor. It is substantially constructed and may be attached to any car in a few mustes.

Sentinel Fuel Tank Alarm.

The Sentinel gasoline tank alarm, made by Zwillinger & Feldman, New York City, consists of a sandplpe which extends upward from the bottom of the fuel container through which the fluid flows until it fails to the level of the ply is exhausted. To utilitie the reserve, a valve is turned and the device may be locked with a key to prevent tampering with the fuel supply. It is attached easily to any tank, the operation involving the cutting of a circular hole about 1.5 inches in diameter in the bottom of the container, the removal of the nut from the latter to allow the washer to rest between the bottom of the tank and the flange of the latter, and the screwing down of a nut on the inside of the tank and the flange of the tank. The device is also equipped with a filter.



Some Recent Accessories, including an Acceptene Lighting Device, Accelerator Pedal, Fuel Tank Alarm and Quickly Adjusted Wrench.

SO 4

VOL. III

APRIL 1912

AUTOMOBILE JOURNAL PUBLISHING COMPANY Times Bldg., Pawtucket, R. I.

William H, Binck, Trrnsgrrr. D. O. Binck, Jr., Secretary. Publishers of

THE AUTOMOBILE JOURNAL THE ACCESSORY AND GARAGE JOURNAL Phone Pawtacket 1000.

EDITORIAL DEPARTMENT:

CARL A. FRENCH. C. P. SHATTI CK. WILLIAM W. SCOTT,

ADVERTISING DEPARTMENT:

New England John W. Queen, 6 Beacon Street, Boston, Mans. Control States-

W. H. Blodgett, 25 West 42nd Street, New York City. 'Phone Bryant 3728.

estern States-

G. A. Eldredge, 304 San Building, Detroit, Mich. 'Phone Cherry 1963, P. G. Larino, 4507 Clifton Ave., Chicago, 111.

PERLISHED THE PIRST OF EACH MONTH

SCHECKIPTIONS

The United States and Mexico, the year, \$1 in advance; Can-ada and Foreign Countries in Postal Union, the year, \$3 in advance. Fifteen cents the copy.

ADVERTISING BATES:

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding. Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire, and municipal apparatus, the motor industry and the irade, will receive attention. Stamps must be enclosed to insure return of unsolicited

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. 1., under the Act of March 3rd, 1879.

TRANSPORTATION EFFICIENCY.

That the mechanical transport is capable of being overated in a manner to bring about decided economy over horse drawn equipment is now generally conceded. So many concrete instances have been presented that there can be no mistaking this point. However, there is one important phase of the situation that is being recognized more targety by both the business man and the vehicle manufacturer. In order to seenre the utmost economy with the motor truck, It must be worked as nearly to its maximum efficiency as is practical.

With some lines of business this side of the problem is more easily solved than with others. Each delivery system has its own particular features, and while it may be necessary to rearrange existing methods to accommodate the newer type of haulage in the retail grocery or department store service, for instance, this is a condition which can be handled jargely by the delivery superintendent with comparatively slight assistance from other sources.

Special attention is now being paid to those lines which in the natural order of things may be expected to utilize vehicles of large carrying capacity, reference being had more particularly to the coal, lumber and kindred industries. With these the body equipment is decidedly essentiai, but the complete solution does not end with the chassis and hody.

Efficiency in motor transportation means that the vehicle shall be kept moving with a useful joad. Obviously, with some industries it is an impossibility to carry a useful load in both directions, and with such the maximum efficiency of the truck is measured by the length of time during which it can be thus employed. Delays at either end of the line must be eliminated first of all, and this presents a situation in which others than those directly connected with the manufacture of automobiles or bodies are cailed upon to exercise their ingenuity.

WEATHER EXTREMES AND HORSES.

According to the records of the board of health in New York Uity, more than 20,000 horses died in the streets of that city during 1911. Seventeen hundred were removed by contractors during the fortnight ending July 8. In one week in December 500 were lost in a similar manner, would appear that extreme cold with its attendant snow and ice, was nearly as fatal to horses as extreme heat.

These figures should prove of interest to the man who is contemplating the installation of commercial motor vehicies, inasmuch as the extremes of temperature in either direction are by no means fatal to the mechanical transport. It ought also to be remembered that the loss occasioned through death by no means represents the sum total of the husiness loss occasioned by dependence upon animal transportation as the result of the weather, since the motor truck is able to work at its maximum capacity when it is unsafe to attempt to utilize horses

MOTOR TRUCKS AND ROADS.

As was perhaps to be expected, one result of the bill introduced into the Massachusetts Legislature seeking to limit the weight of industrial transports using the public highways has been to call direct attention to the economic value of the vehicles. And it is of special significance that the motor truck has demonstrated its sbility along this line so satisfactorily that in every case there has been no disposition to dispute its superiority.

in the first place, it must be admitted that roads, good or bad, exist for the benefit of the public. Little thought has been given to this matter in the past. Governmental reports show that much of the so-called high cost of living is directly traceable to the difficulty experienced in getting farm products, for instance, to the market, and hy no means ail of the transportation cost is charged to the railroads.

if this problem is to be solved by a more general use of motor trucks, it would appear to be good economics to consider the construction of roads which will stand up under modern usage. No one seriously questions the fact that the transportation of the future is to be by mechanical means. it is poor public policy to discriminate against a type of transport of such large importance as the motor vehicle.

THE A B C OF MOTOR TRUCK OPERATION.

A Simple Exposition of the Principles Underlying Operation, Maintenance and Repair of All Motor Driven Commercial Cars, Describing Details of Their Components. Part XVII-The Progressive Transmission and Other Types.

By C. P. Shattuck,

THER forms of sliding gearsets are utilized in motor truck construction besides that of the selective type previously described but they all serve the same purpose, that of providing a varia-



ble rotation of the driving wheels without necessarily the speed of the motor to bring about the desired results. The components of the gearbox or transmission in the mechanical transport are subject to stresses not encountered by the mechanism of the pleasure vehicle, and in designing and constructing these memhers the angineer has made them sturdy, of high grade material and as simple as possible. To prevent damage by careless operation devices are incorporated so that changing from a forward speed to a revorse with muchine

Fig. 6B-Hepleting Quadrant and Lever I tilised with Progressive Type of Transmission, moving cannot be accomplished except by design. In the selective type the changes of speed are effected

by a lever at the side of the driver and this may be at the right, left or centre, according to the design of control. The quadrant, or metal frame is so slotted that the lever may be pushed backward or forward in any one of the three parallel channels. For example, if the lever be moved forward in one channel it engages or brings into mesh a set of gears which produces the low speed. Bringing the lever directly back releases the gears already in mesh and slides a different set into engagement; for instance, the second speed. To shift into the third, the lever is moved sidewise and thrust forward into the direct or third speed. The fourth is obtained by a backward movement, and the reverse by moving the lever into the third channel, but before this is done a catch or stop member must be released. This device is fitted to prevent the operator shifting from a forward speed into the reverse when the use of the latter is not desired.

The selective quadrant is not always H shaped, some being similar to a slot, but the movements in changing speeds are the same. It is customary to mark the positions or speeds upon the quadrant and it will be noted that the location of these varies; that is, the same relative movements of the lever will not bring about the same changes of gears on all machines

One of the earliest practical forms of sliding gear mechanism was the progressive, which derives its name from the fact that in advancing from the low to the high, or in reducing from the latter to the low, one must go through the different speeds. If in the reverse, the low and intermediate must be gone through to reach the high or direct.

A conventional type of progressive gearset is depicted at Fig 70, and it will be noted that the design makes for simplicity inasmuch as the shifting mechanism consists of a single yoke operating in conjunction with a shifting rod. The gears are enclosed as are those of the selective type, In a box or housing which is constructed so that the upper half may be removed, and these cases are provided with inspection or handholes for the purpose of replenishing the supply of lubricant.

Two shafts are mounted so that they revolve freely, the mainshaft being a compound while the other or layshaft la a simple member. The mainshaft is square in form, is connected with the clutch member and rotates when the clutch is engaged. Gears A and B, Fig. 70, move freely upon this shaft when actuated by the yoke, but unless one of these gears is in mesh with another on the layshaft, or the member A is moved so that the high or direct drive is brought into use, the shaft will remain stationary when the clutch is disengaged

The layshaft, which is a round member, carries four ninlone and it will be noted that these are of different size The smallest of these is constantly in mesh with the largest gear in front of the pinion member and these are known as the constant mesh gears, their function being the same as those described in the selective type of gearset. All pinions on the layshaft are fixed members; that is, they cannot rotate without correspondingly moving the shaft. When gears

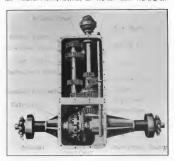


Fig. 70-Ontlining the Components of Progressive Form of

A and it are so located on the mainshaft that they are not in mesh with any other pinlon or the high speed is not engaged, a neutral position is brought about, and when in this position the clutch may be let in without imparting movement to the countershaft and thence to the driving wheels through the pinion and crown gears.

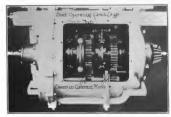


Fig. 71-Transmission of the Constant Wesh Gene Type-Which Changes of Speed Are Effected by Clutch Hogs,

Assume that the car is standing still, the clutch is disengaced, and the iever in the quadrant is in neutral position. To bring ahout an engagement of the low speed, the elever is moved forward until the first speed nototh is reached, which movement sildes the yoke and gear B along the mainshaft until the gear meshes with the low speed pinion on the layshaft. The clutch is then let in, and the mainshaft rerevolves, turning with it the gear li which in turn imparts in motion through the low speed pilion and the layshaft revolves as does its constant mesh gear. The latter being volves as does its constant mesh gear for the containt mesh member rotates this, which is connected to the pilion gear, imparting motion through the crown gear and countershaft to the road wheels.

To change to the second or hiermediate speed, the clutch is released, and the lever moved backward Into the second apeed stop. This movement slides the gear A into mesh with the second speed pinton and motion is imparted to the road wheels by the same process as with the low speed. In changing to the direct or high speed, the lever is moved into the third speed note whelm sowement slides gear A and the positive jaw clutch into engagement. The mainstaint is then rotating at engine speed and the reduction between the speed of the motor and road wheels is obtained by the gear ratios of the pinton and rown mem-

To bring about a reverse movement of the machine, the gear shifting lever is moved to the reverse note, which brings gear B into mesh with the intermediate reverse idder, and when the clutch is let in the idder member will rotate in a direction opposite to that of the mainshaft. The idder being in mesh with the reverse pilnion the latter will revolve the layshaft on which the constant mesh gear will rotate the other constant mesh member in an opposite direction, bringing about a backward movement of the vehicle. In changing from the reverse to the first speed, and thence to the high, the different gears must be meshed, as previously explained.

At Fig. 59 is shown the gear shifting lever, also the brake member and the quadrant with the nothers clearly outlined. It will be noted that the gear changing member is fitted with a nonthed member, actuated by a spring, the object of which is to hold the lever in the position set. A red connects the notic member and is pivotally mounted to a handle for the purpose of releasing the tooth when a change of speeds is desired.

Other forms of transmissions are utilized in addition to

those of the selective and progressive types outlined. At Pig. 71 is presented a georbox of the constant mesh type for which many advantages are claimed, among these leving an even distribution of the load around the shaft and the eliminating of danger from stripping teeth through careless operation. With this type there are two sets of sears in constant mesh and the mainshaft is provided with clutch dogs of sturdy construction and high grade material. These dog members are shifted into and out of engagement and when one is locked or meshed with a gear imparts motion to the pulnou with which it is constantly meshed. Changes are effected by a lever and this type of transmission is made in the selective form; that is, the operator may change from one speed to another without going through the intermediate speeds.

A selective clutch patented transmission is depicted at Fig. 72 and with this type the gears are constantly mesh. Any desired speed may be obtained by the operator by movemens of the controlling lever actuating a clutch which in turn sides a goar into engagement with a similar member.

The mainshaft is a squared member and carries a number of movable gears or clutches. It will be noted that gears B, C, D and E, are in mesh with other members discretly opposite, and that between the gears on the mainshaft are a number of smaller members. The male clutches at W operate on the squared portion of the mainshaft in either direction, and mesh in the female clutches at 0 0 0 0 which movement in turn drives the constant mesh gears. As a large number of teeth engage at the same time it is obvious that the load is distributed and stresses reduced to a minimum. On the high speed, the male clutch A releases from the female inside B, leaving gears C, D and E idde, and drives directly through the mainshaft to the different directly through the mainshaft to the different

As gears and chitches are subject to heavy stresses they are constructed of a hish grade steel and cut accurately by special machinery. The edges of the gears in the sliding type are channered to facilitate their meshing. Roller and hall bearings are utilized; that is, the shafts revolve on these members, which operate in a bath of heavy oil or tubricant. The gearboxes are constructed dust proof and the halves machined carefully so that an accurate fit is ob-

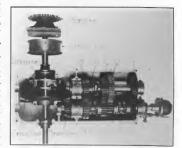


Fig. 72-Another Form of the Constant Mesh Benr Tenusumlasion of the Selective Type.

tained, thus preventing the escape of the lubricant.

in some designs the gearbox and differential housing are constructed as a unit, as shown at Figs. 70 and 72. In

the former the housing is separated by a partition, an arrangement which provides for the use of a different grade of lubricant in the gearbox and for the differential scars.

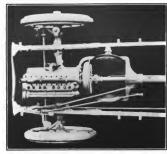


Fig. 73-Friciton Transmission tillining blace for Low and Revene-The Chilch is Shown in High Speed.

Where the final drive is by chain, the transmission and ditferential are employed as a unit as indicated.

Where shaft drive is employed, or an internal gear drive on the rear wheels, the gentrous is usually located amidships, although it may be placed on the rear axis and made abust, although it may be placed on the rear axis and made at part thereof. Gears are now wholly employed in the constant may be used. This is a state of the state of the state of the drive is being utilized on many leading mechanical transports.

Mention has been made of the friction transmission in which energy is imparred to the driving wheels by a disc in contact with a similar member integral with the hywheel is not the motor. AF Pigs. 75 and 74 are presented a form of friction transmission that is unique, inammed as it is employed only in bringing about the low speed and reverse ratios. The direct or high speed is secured by a cone clutch which differs only from those of the usual form in that it may be moved from contact with the female member or flywheel to a considerable distance. This is necessary in Lis, to bring about the low speed and a reverse movement which are obtained by moving the cone member forward or back as necessary.

The friction member is clearly depicted at Fig. 74 and in engagement with the other dises. The former is stideably connected with the propeller shaft and is moved forward or backward, being operated by a lever convenient to the driver. In practise the clutch is held out in starting and a feature of the transmission is that the driving dises are stationary when not in operation. That is, they do not revolve when the high speed is being utilized, as the cone-clutch engages with a similar member in the flywheel moving the latter away and out of engagement with the pair of dises. When the clutch is released for a neutral effect, by a pedal, the flywheel member does not come in contact with the dises until the operator moves the controlling lever. When the latter is operated and the clutch let in, energy is transmitted through the driving dises to the driven dise.

An innumerable number of ratios is obtained. When the driven disc is near the centre a very low speed or reverse is obtained. This ratio is increased by moving the driven disc toward the perliphery of the driving members. At Fig. 74 is shown the discs in engagement for the reverse and as the centre disc is near the centre of the driving members a low ratio will be obtained.

If the driven disc be earried torward of this centre position, a forward speed will be produced, the ratio being determined by the position of the driven member; that is, the nearer to the flywheel, the screater the speed. This forward and reverse movement to brought about by the driving discs, which rotate in opposite directions.

(To Be Continued.)

Ed. Note—The next installment will deal with the differential and the different methods of transmitting power to the driving wheels.

FALL RIVER TO BUY AMBULANCE.

Faif River, Mass., has decided to follow the example of other progressive cities in adopting the automobile for municipal service. It was voted recently to purchase an amindance, and \$4000 was appropriated for this purpose.

JARVIS-HUNTINGTON'S GUARANTEE.

The subject of the written guarantee supplied by manufacturers of commercial vehicles when making a sale is one which interests prospective purchasers, and to which many makers have given extended consideration. The Jarvis-Huntington Automobile Company, Huntington, W. Va., maker of the Jarvis-Huntington line, has given the matter very careful study, and has formulated a guarantee which the believes will make a decided appeal to those who are interested in the purchase of automobile equipment. It reads as follows:

"We guarantee our trucks against defective material and workmanship for 10,000 miles, to the extent that we will furnish, free of charge, new parts in exchange for defective parts, provided said defective parts are returned to us, charges prepaid. This guarantee does not apply to tires,



Fig. 74—Friction Transmission, Depicting the Oriven Flor in Position in Obiain a Backward Movement of Vehicle, electrical equipment, wear and tear, arcidenta or misuses of track.

"JARVIS-HUNTINGTON AUTOMOBILE COMPANY"

KISSELKAR TRUCK IN NOVEL USE

Commercial vehicles are put to many uses among which may be mentioned that of hauling supplies and transporting the products of the farm to the railroad, etc. In breaking the ground, isosveyr, a tractor usually is employed, but Orlando Morro of Visilia, Cal., has adapted his three-ton Kisselfkar truck, made by the Kissel Motor Car Company, Hartford, Whs., to this work, 1 lie fitted the rear wheels of the machine with flanges, as will be noted in the accompanying illustration, and with these devices obtained traction enough to haul a 24-double-disc cultivator in front of a 12-disc seeder. The machine is utilized for plowing, seeding, cultivating, etc., and in addition hauls supplies and secforms all work formerit done with horses.

The vehicle is equipped with a four-cylinder, four-cycle, water-cooled motor having a 4.873-linch hore and five-initiation, and a second five-initiation and a second five-initiation and inhibitation is by splash. A leather faced cone clutch is utilized and the transmission is of the selective type providing four speeds forward and reverse. Plusi drive is by chain and a differential lock is fitted. Solid

G. M. C. EDUCATIONAL CAMPAIGN.

Gleeson Murphy, vice president of the General Motors Truck Company, Dertol, left that city recently for a trip to floston, New York and Philadelphia, where he will hold conferences with the selling representatives of the company. The Detroit ceneral is promoting an educational campaign and is planning to give every manager and sales ascent a complete knowledge of the responsibility, permanency and manufacturing scope of the company, and to this end Mr. Murphy will give a series of talks at each point visited. He will also touch upon local conditions and discuss other features of interest to the branches to

He will be followed by expert engineers in both the gasoline and elevtric neld, who will discuss the G. M. C. trucks and give such rechnical information as will enable the salesmen not only to become more proficient in talking about the various models, but a better understanding of transportation problems as they affect individual companies. The service system of the company will also be discussed. This is an important branch, analyting as it does, the needs of any husiness and making such transportation



KlaselKar Three-Ton Truck tillised by Oriando Moore of Visalia, Cal., for Plowing, Seeding, Cultivating, Etc,-The Reac Wheels of the Machine Are Equipped with Flanges to Provide Traction,

tires are employed, the front members being 36 by four inchies, single, and the rear are dual of the same size. Two sets of brakes are provided, internal on rear wheels, and external on jackshaft. The wheelbase is 144 luches and the space back of the driver's sent is 12 feet 3.5 inches

WAR DEPARTMENT BUYS MAIS TRUCKS.

The l'utited States. War liepartment has placed an order for four Mais trucks, made by the Mais Motor Truck Company, Indianapolls, Ind., and has sent a squad from the ambulance corps to the factory. The soldiers will be instituted in the care and maintenance of these internal goar driven machines which will be utilized for field duty service at Washington.

The trucks are practically completed and have been constructed sturftly and in keeping with the requirements of the government, being equipped accordingly. Largewheels are fitted, these being with 6ve-luch dual tires. The bodies are provided with adjustable seals so that they may be used for carryalls about the forta or for ambulance duty. The litters are suspended from the roof of the car by straps.

recommendations, either gasoline or electric, as are best adapted,

The engineering corps will be followed by representatives of the sales department and other business authorities who will discuss branch management and salesmanship. This series of talks is intended not only to bring the various branches together in hetter understanding, but enable; the agents to discuss transportation problems with prospective nurchasers.

ADD TO 'BUS LINE.

The North Shore Transportation Company, which operstes motor vehicles between Lynn and Srampeott, Mass, is having another machine constructed to go litto commission in the spring. The company, which was incorporated last January, comprises Patrice Theriault, Eben II. Phillips and James J. Liffin. The concern intends to experiment with pneumatic tires on the front wheels of the new vehicles and cushion members on the rear. The 'but now in service averages about 1900 miles a week, it is said, hereacen the towns mentioned.

AVAILABLE WAGONS FOR LIGHT DELIVERY.

L light delivery wagons, ranging from 1000 to 2000 pounds capacity are meeting with decided favor in all sections of the country. Their size is such as to make them marticularly adaptable to many lines of business. It

Avnilable Light Delivery Wagon Fitted with Flure Board Body,

would appear that the manufacturers realized this, in view of the large number of such machines which has been placed upon the market within the past few months.

Among the latest productions of this character is the Available, made by the Available Tenck Company, Chicago and the Available and the the Available that the Company is the Available of the Available that the Available of the

The maker has paid particular attention to the power plant, which may be conceded to be one of the important

features of any motor vehicle. In both wagons, the motor has been designed for the work which it is called upon to accomplish, and no pains have been spared in carreine out this blea.

in the smaller car, the motor has a bore of five inches and a stroke of four, being of the water-cooled, two-wilnder, four-cycle type. The connecting rod bearings are of brass, babbit timed, while the other bear-ings are of Parsons white brass. The material is such as is calculated to make for long life and efficiency.

The oiling system comprises a reservoir of 2.5 gallons capacity, located in the crank-case. The lubricant is circulated by means of a centrifugal pump driven by the cambatt. The entire system has been tried out under exhaustive tests and is field to be thoroughly efficient.

In keeping with the demand for some method of regulating the speed of the truck in the hands of the operator, a centrifugal governor is fitted, this being directly con-

nected with the butterfly valve in the intake manifold just above the carburetor. When this is set to any certain speed, it is impossible for the driver to exceed this limit, without knowledge of the owner. The radiator is of the square tube type, extra large, and is guaranteed to keep the motor cool at all times. The drive is by shaft to the jackshaft, thence by two Diamond roller chains to the rear wheels. The transmission is

planetary, and is a unit with the jackshaft. Both sets of brakes are located in the rear wheels, the emergency members being of the expanding type and the service, contracting.

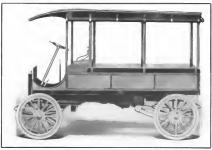
Wheels are 34 inches in diameter, litted with solid rubber tires. An option in the size is permitted, being either two or three inches in cross section, depending upon the load to be carried and the desires of the purchaser.

The one-ton model is very similar in design, but is made heavier in almost every respect. The motor has a bore of 3.23 inches and stroke of four, employing the same circulating oiling system and centrifuxal governor. The brakes consist of 10-linch service members on the Jack-shaft and 12-linch energacety brakes on the rear wheels. A similar tire choice is permitted, the cross section being from 2.5 inches to four. The wheelbase of this model is 108 inches. The maker has found that the larger wagon makes a

decided appeal to furniture concerns, and has arranged to provide a standard body for this work. This has a loading space of 44 by los by 24 inches, with a 22-inch tail gate, which extends the available loading space to 10 feet. 10 inches.

WILL REPRESENT ROWE PRODUCT.

The Rowe Motor Truck Company, Coatesville, Penn., which made Initial display of its Rowe trucks at the recent Grand Central Palace show in New York City, announces



Larger Type of Available Vehicle with Open Grill Express Body,

the appointment of George I. Pound as general eastern sales manager, with temporary headquarters at 327 East 84th street, New York City. The company anticipates a successful season's business, particularly in the East.

ECONOMIC METHODS OF COAL TRANSPORTATION.*

Relation of Proper Loading and Unloading Facilities to the Maximum Efficiency of Mechanical Transports .-- Suggestions for Reducing General Operating Costs.

By William Kennedy, Consulting Engineer.

transportation of coal with motor trucks the vital question is whether the conditions of operation can be so modified as to permit of applying the machine to such an amount of its capacity as will reduce the present cost with horses. in other words, there is no question that, if conditions are arranged so that the machine can be permitted to operate for a sufficient period of the working day, it will readily effect a saving.

There are at present many impediments to such machine employment, due largely to delays incident to making the delivery as well as the delays quite frequently experienced in loading at the coal yard. I'nloading conditions present the greatest difficulties because they are usual-

IN ATTEMPTING to supersede horse equipment in the sibility of selecting an equipment of such character as to permit of its use in other lines of service when not required for coal transportation.

Relative to Loading Means.

That the difficulties referred to with regard to loading operations can be changed to provide for quick loading by mechanical means is quite apparent from the number of coal yards which are equipped with hoppers and other mechanical devices which provide for quick loading of the coal, but where such equipments are not in existence the coal dealer has not only the consideration of purchasing an expensive equipment of automobiles, but frequently in addition an expensive modification of his yard facilities.

it goes without saying that the ideal way to load mo-

tor trucks would be automatically from the hopper system, the machine passing under the hopper and taking its load in a very few minutes and immediately starting upon the delivery. If this hopper equipment be not in existence the most inexpensive solution of the matter of lessening the delay in loading would be to employ extra bodies, which might be loaded in the absence of the machine and which could be quickly mounted or demounted by the power equipment of the machine itself. This plan might avoid the necessity of any serious change in yard equipment and the cost of loading by hand would not be a serious consideration when contrasted with the investment necessary for mechanical loading. Several plana already have been employed by which separate or spare bodies are



Mr. Kennedy Considers Londing by Means of Overhead Hoppers to Be the ident Method.

ly beyond the control of the operators, but the yard conditions being absolutely in the hands of the coal operators, there should be no reason why the loading of coal cannot be accomplished with very short delay to the machine.

Another Important consideration is that unless the loading and unloading of the coal is performed by mechanical means it is difficult to show a saving, unless the distance over which the coal is transported is sufficient to make the speed of the truck effective as a saving. The dependence upon any hand method of loading and unloading is prohibitive.

Another impediment is the fact that the transportation of coal is a seasonable performance and the long months of inactivity, as well as the difference in volume of business between the mid-winter conditions and the periods of lesser activity at the beginning and end of the season, make it somewhat difficult to decide upon an equipment which will be large enough to take care of the maximum conditions and yet will not involve too much investment for the average or normal conditions, and further, the pos-

utilized in this manner, the body in some cases being hoisted vertically off the truck and held in a suspended position while being loaded until replaced on the machine again for delivery

Provisions for Unloading.

In making deliveries of coal such a variety of conditions are encountered as to make it often difficult to determine whether the automobile body should be stationary with end or side inclined chutes; whether it should be a body capable of being lifted vertically, or whether it should be tilted at one end or possibly tilted and the hody dumped to the ground as is occasionally necessary in handling soft All these types of hody equipments on machines are in use, as well as the scheme of handling a jarge ouantity of coal on the semi-trailer equipment, which has the advantage of transporting the greatest portion of the weight over ordinary large diameter wheels with steel tires, but the final determination as to what class of body will be selected must be determined by the particular operating conditions for which the machine is intended.

It is certain that larger loads of coal can be transported by machines than by horses, and in very much less time. but sometimes the delivery conditions of the operator pre-

^{*}traper read before Retail Coal Dealers' Association of New England, at Boston, March 14.

vent hun from utilizing the larger sizes of machines in view of the fact that his deliveries are to be made in smaller quantities. Such a case as this is caped with by the employment of a large machine with several compartments in the body so that any one of two or three portions of the load may be discharged without interfering with the balance.

The problem, therefore, is not whether coal can be transported more cheaply by machines than horses, but transported more cheaply by machines than horses, but whether the existing conditions in any particular case will be permit of the employment of the machine to naything files its economic capacity. Sometimes these conditions are uncomic capacity. Sometimes these conditions are uncomic capacity in bringing about new conditions which personal taking advantage of the machine's utility machine's utility.

in many cities coal has to be delivered in the most inaccessible places; assumement to very small manholes at the city of the sidewalk, sometimes through openings which are located at the building rather than at the edge of the walk, and in other linearces into openings which are in the walls of the building above the walk. It seldom happens, except in industrial institutions, that the coal can be directly unloaded below the place on which the machine stands. Wherever these conditions can be changed so that an inclined inter or chute can be provided from the machine to the coal pile the quick discharge of the coal from

can be arrived at is by taking the entire year's cost of operation and upkeep and charging this to the total tonnage transported annually, but we frequently find that only the enrrent charges for the daily operation of the horse vehicles when in active service are charged against the transportation for the current day, and this data alone is the one with which machine operation is compared. Again, we find the reverse condition, as where an installation may be active 26 weeks of the year, while the total cost of the year in bulk is divided by 300 to arrive at the cost a day and this cost a day used as the basis of determining the cost a ton delivered for any day of the 26 weeks. As a matter of fact, the annual cost in this instance should have been divided by 150 to determine the cost chargeable to each active day, and on this basis the cost a ton would be twice that of the former,

Variable and Constant Changes.

The whole problem requires segregation of those charges which are constant whether the which is employed or not, and an additional charge for those times affected by activity added to the first or fixed charges on as to arrive at a true cost of unit performance, whether this latter be based on a tonage rating or on a ton-mile basis. It is quite possible in determining the operating cost of machines to follow a similar practise of separating the inactive or constant charges from the arrive charges and the total charge for



Two Types of Font Builtes in General Car. That at the Hight Being Besigned for Side Delivery and That at the Left for End Dumping.

the machine can be accomplished, but this is frequently impossible, and in some cases a form of chain bucket conveyor has been fitted to the machine so that the load may be transferred in this manner to points which are otherwiseling existing.

Cost of Transportation.

In the matter of securing from roal operators reliable information on the cost of transportation with horse equipment there appears to be considerable difficulty, due principally to the variety of bookkeeping methods, wherever they exist, and the lack of any sulformity in cost a ton or other unit delivered is due to consideration which must be given to the complete inactivity of the equipment during a pertion of the year and the variance of activity from one end of the busy season to the other.

Some installations require the maintenance of the horse sequipment during the entire year, due to the difficulty found in the seiling and replacement, but quite frequently the expense of this all year maintenance is reduced by panaring the horses in the linetive period. In other cases the horse equipment may be hird out for their service, but in few cases is there any provision for the employment of the vehicle equipment during its inactivity.

The only safe and general way by which the cost a ton

day thus arrived at should be used in the determination of the coat of delivery per ton or per ton-mile.

To exemplify this the attached table may serve to show the charges indisenced by service or linacity. The tense marked "variable," however, are dependent upon each operators particular condition and to cover charges for granging and for operators we have assumed a figure of \$400 a month for garage and \$250 a week for inhor. This table with the total figures shown is intended to cover a year's operation and a performance of \$500 miles and any a vehicle.

How Table Is Compiled,

In this table it will be observed that on each size tracks there is a figure for Need charges, which includes interest at six per cent, and a depreciation of 10 per cent on those parts of the vehicle which are not subject to sear and which are replaced or renewed under the heading of malineannee charge there is a factor for the night charge of mechanical wearing parts and another for tires, and in the operation disloid there are fluxers covering consumption of gasoline and inbritcating oil, operators and other incidentials to the coan of newton.

Assume that we are to determine the cost of operation of a five-ton truck which is employed the entire year. The hems for fixed charges, garaging and operators are constant



Type of Tilting Body, Arranged for Bear Humping and for Carrying Complex Lands.

and ladependent of the tonnage or mileage performance of the webties. This charge against the webtie while inactive will amount to \$7.55 a day, assuming 312 working days to the year, and the total of the maintenance items, toso solved into a cost of 11 cents a mile, since this cample is intended to cover a 50-mile performance each day for 312 days.

Now, with the linective charge of \$7.55 a day and the charge of 11 centa a mile, by multiplying the latter by the analysis of the contact of the charge of \$7.55 and \$

Assume that the track covers 32 miles and delivers 31 tons. Thirty-three multiplied by 11 cents a mile equals 43.63, the active charge, and this added to \$7.56, the in-active charge, makes the total rout of the day's performance is the delivery of 31 tons, we divide this figure by 31 and find that the cost a ton is 36 cents. In a similar manner any other performance and the calculations of the second of the cost at the second of the second of

In the event of the machine being used only half of the year the fixed charge of \$7.56 would be reduced by 50 per cent, of the annual charge for operator and a reduc-

tion of the garaging charge during six months to say \$5 a month, thus making the fixed citarge for the days the machine is rendering service \$4.93 instead of \$7.56, and consequently, reducing the cost a ton in the particular case cited to 27 cents instead of \$6 cents.

If for comparison against such machine cost we have a definitely known cost of transportation a ton with horses, it is quite possible to determine the performance limits of the milesge and tonnage which the machine must accomplish to equal or better the horse cost.

Independent of the higher charges for interest and depreciation which must be made against the machine equipment, it must be recognized that whenever this maall the other charges against It comes, with the possible exception of storage, while this is not the case with the horse equipment, which must be fed and cared for almost independent of the service rendered, so that if the machine equipment were not used for six months of the year there might be a considerable reduction in expense over that required to maintain the horse equipment during the same period.

Finally, it should be borne in mind that if there is a long period where the machine is not required for roal transportation and the operator maintains his own garage, it will be quite possible to rent such an equipment as profit able figures in other lines of severe, and while assuming control of the garaging and maintenance of the vehicles the owner takes little risk or hazard

in leasing the vehicles for such extra service.
It can be recultly assumed that such service can be leased
at a profit and if this profit is credited against the winter
performance cost of the equipment in delivering coal the
inactive months of the coal business may thus be made a
benefit rather than a detriment to transportation cost by the
employment of a motor truck equipment.

GENERAL ANNUAL AVERAGE OPERATING COSTS.

Machine Size	2-Ton	2,5-Ton	5-Ton	6,5-Ton
Interest on investment & 60% and depreciation on non-wearing parts & 10% 1	\$376,00	\$45× no	\$4.414 049	\$100,00
Maintenance-				
Wearing parts	346,60	420,00	457,00	195.00
Tires	258.00	\$15.00	757,00	**6.011
tenraging-				
Storage, washing garage labor, in-counce (vari-				
ablet	*720.00	*720.00	*120.00	*7.29,944
Operation-				
Casoline w 10c a gal Lubricating oil w 25c a	250,00	300.00	275.0a	300.00
gal	39.00	75,00	105.00	119.00



chine equipment is not being used. All Steel Coal Humping Body, Which Might Deliver to Hote immediately Under the Truck,

(variable)	*1.040.00	*1,01n.on	*1.0 tn.00	.1'0 ta ou
	\$3,129.00	\$3,532.00	\$4,084.00	\$1,469,00
*Assumed,				
		-		
Based on performance of days a year,	f So miles	a day a	truck, 312	working
Total fixed charges, ga				
truck				\$2,360.00
Total fixed charges, ga				7.56

Total charges for muintenance, gasoline and oil, fiveton truck Total charges for maintenance, gasoline and oil, live-

on truck, a day 100 truck, a mile

KNOX EASILY PAYS FOR ITSELF.

The subject of transportation economics is one which is being studied in all its phases by those who are coutemplating the introduction of motor haniage. Assistant Sales Manager Charles F. Barrett of the Knox Automobile Company, Springfield, Mass., maker of Knox trucks, is deeply interested in this matter, and cites at least one instance in which a six-ton vehicle paid for itself in one year.

The owner was a large truck concern in a western city, which had a contract to remove ail the city garbage, refuse, etc., three miles outside to a reduction plant in the outskirts. For five years this work had been done with horses, and as the concern was contemplating the installation of mechanical transports, very careful figures were kept of the actual cost of operation, including all items, for use as a future basis of comparison.

To do the work successfully with horses, it was found necessary to employ five two-horse teams of three tons capacity each, four of the teams making three round trips daily, or 18 miles, while one team had to make four trips, or 24 miles. Each of the five teams alternated in turn for the extra trin. This arrangement was found to be the most economical for operation with horses, and the daily cost, incinding ail items, such as drivers' wages, repairs, depreciation, interest, etc., averaged over \$6, or a total daily cost for the five teams of about \$30,

The company purchased a six-ton Knox truck, fitted with 50 horsepower motor. Very liberal allowance was made for tire repairs, depreciation, wages, etc., and the daily cost figured out close to \$15. This single truck was easily able to move the entire 48 tons of refuse in a working day of 10 hours, supplanting the five two-horse teams and drivers. It thus effected a saving of \$15 a day, or actually paid its own cost, \$5200, in 347 working days.

HORSE REPLACED IN CANADA.

One result of the recent automobile shows in Canadian cities is the increased interest in motor tracks throughout the Dominion. Fred J. Titus of the American Locomotive Company, New York City, maker of Aico cars, recently returned from an extensive trip throughout this district, reporting \$71,000 in sales within two weeks. He tells of two veteran horse users who have decided to replace their old equipment with modern motor trucks.

J. B. Smith, head of a large lumber concern, who has utilized horses for 60 years and is famous throughout Canada for the fine type of draft animals in his service, has bought four mechanical transports, which he will equip with hydraulic lifts for moving lumber on and off the vehicles. James Crow, another well known horseman, whose animals have taken many blue ribbons at the New York horse shows, has given up dealing in horses and taken an agency for motor cars and trucks.

Mr. Titus also reports that considerable interest is being taken in an endeavor to use wood block tires instead of rubber. Oak is used almost exclusively in this connection, and the entire country is deeply concerned with the result of the tests now under way.

HARRY W GRIFFITH PROMOTED.

Harry W. Griffith of Indianapolis, Ind., who has been the secretary-treasurer of the Remy Electric Company, Andergon, Ind., well known maker of ignition and lighting specialties, has been appointed general manager in place of W. R. Poland who has resigned to affiliate with a new company which has been organized in Anderson for the manufacture of self-starters for motor cars. Mr. Griffith has had a long experience in the manufacturing business, baying been connected with the American Creasoting Company of Chicago prior to joining the Remy concern. His many friends wiit be pleased to learn of his promotion.

SHAWMUT TIRES AT BOSTON SHOW.

One of the most educational exhibits among the accessory displays at the recent initial Boston motor truck show was that conducted by the Shawmut Tire Company of that city. At this space was seen the whole process of making tires from rubber. The rubber tree was presented, and the method of sapping it, as well as the large biscuits of pure rubber, the form in which the product is shipped to this country. Shawmut tires also were shown in all the different stages of construction

ADAMS TRUCK SAVES MONEY.

The Adams Bros. Company, Finding, O., is in receipt of figures from an owner of one of its one-ton vehicles. According to this statement the truck is doing the work of three two-horse wagons, at a saving in cost of equipment of \$442.75, and in operating expense of \$2567.98. The actual

figures follow:		
Intes)ment, Horses-		
Seven horses to \$150 classed on one extrac-	\$1750.00	
Three Wagons is \$275	525.00	
Three double harnesses to \$65	3 45 444	
Seven blankers to \$2	14,00	
Seven halters to \$1.25 .	9.72	
Total		\$2792.75
lavenment, Truck-		
Model A. Adams one-ton 110ck	E100.00	
Express body and top, plus freight.	250,00	
	-	
Total		\$2350.00
Saving on investment.		\$440.75
Operation, Horses-		
Three drivers @ \$70 a month	\$2520.00	
Stable feed, veterinary, etc.,	2265 000	
Repairs and painting, wagons.	1.75 00	
Repulra, harnesses	23 000	

Penreclation on horses & 16.6%	241.66	
Depreciation on equipment & 15t,	155.11	
Total		\$2245.6
Operation, Truck-		
ligiver 6 \$75 a month	5000 000	
Helper of \$60 a month	7 . 0 100	
Gazeline, five gallons a day & 11 cents	230000	
Oll and grease	10 000	
Repairs and painting	304 99	
Oil for lemme and incidentals	201.1949	
Tire maintenance	200 00	
Garage	12 00	
Interest on luvestment 9 67.	111 00	
tepreciation % 1660	391 66	
Total		\$7991.6

Favlug on operation



MECHANICAL NOTES AND



REMOVING CARBON FROM CYLINDER.

Carbon deposits on the piston head and in the combustion chamber not only cause a loss of power but an excess of the matter is productive of premature ignition and a moisy motor. Where a large quantity of inhiratent is fed to the engine, carbon accumulates very rapidly. It should be removed and the operation does not require the removal of the cylinder as the hurnt matter may be cleaned from the head of the piston by utilizing a scrapes which may be constructed easily from a piece of .25 or .3125 loch soft steel. The ends of the metal are flattened in a forge and bent hoe shaped, after which the edge is sharpened by grinding on an enerry wheel or grindstone.

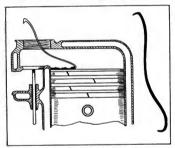


Fig. 1-Depicting How Carbon May Be Removed from Cylinder with Home Made Scraper.

At Fig. 1 is depicted the tool and the method of operation. The valve cap is removed, the piston brought uptible top of its stroke by cranking and the scraper inserted. The latter may be bent to obtain the desired angle, and means of the sharp ends of the scraper the carbon loosened and removed.

Sometimes it is advisable to remove the cylinders; in fact, many operators who take care of their own nuchines make it a practise to clean the carbon out of these members at stated intervals, this depending upon the time theorem that here in the second intervals, this depending upon the time the car has been in service. The removal of the cylinders is an easy matter hit in taking of the rings to set at the carbon back of these members the novice is apt to hreak the rings, which are brittle.

At Fig. 2 C is shown a method of utilizing old backsaw hindes or smooth strips of metal. Three or four are necesnary and these are slipped between the ring and piston proper, as shown in the aketch. This will permit of drawing the rings off without danger of damage. The top ring should be removed first and the remaining members in order. In replacing them, the lower ring should be sprung slightly and slipped over the head of the piston and the blades inserted. The ring is then pushed downward and slipped into

the recess. The next ring is replaced and the operation repeated until every one has been fitted.

Care should be taken to note that the openings of the rings do not come in a line. If they are of the pinned type this precaution will not be necessary but otherwise they should be so arranged as to prevent the loss of compression.

Replacing the cylinders will bother the novice and unions care be exercised one or more rings will be broken and the fingers injured. While one familiar with this work can put back a cylinder alone, the amateur repairman should have assistance. With a helper to hold the cylinder and the workman to compress the rings the operation will be accomplished easily.

There are several methods of compressing the rings so that the cylinder will side over. Some employ a string, but a better method is to make a clamp such as depicted at B. This should be constructed from a piece of flexible metal .125 inch thick and about .5 inch wide. It should he an inch or more longer than the circumference of the piston and when hent into a circle as above, should be slightly less to enable the device to compress the ring flush with the piston.

To use the tool, it is placed over the top ring, compressed with a pair of pilers and held while the helper sides the cylinder downward, which operation will move the ring holder at the same time, allowing the cylinder to pass over the ring. The operation is repeated until all of the rings are in position. If the operator desires to do this work without assistance, the ends of the holder may be tapped, drilled and fitted with a screw and locking nut. This will enable the workman to champ the rings to that its upper part is exposed. The cylinder is then alld over until it comes into contact with the champ. The latter is then released and placed over the next ring and the operation repeated.

TRUING UP COIL POINTS.

To obtain efficiency from a coil it is essential that the platinum points be kept clean as well as that they should seat properly. When these members are so adjusted that the strength of the current is in excess of amount stated by the maker of the coil, the metal will have or fuse and the surfaces of the points will be pitted and uneven. When these conditions exist considerable more electricity is required to overcome the resistance set up. This not only wastes current but the operation of the motor is affected.

There are several devices for truing up the points, such a jigs, etc. Some utilize a velvet file, but it is difficult to remove the rough places evenly and in addition, a considerable amount of the platfum is likely to be wastedwardle. With the methods outlined it is necessary to remove both the upner and lower parts to do the work properly.

A simple and efficient repair and one that may be made-without displacing the paris is shown at Fig. 2 D. It consists of a strip of fine emery paper placed between the two points as shown. The work will require two operations, that of the treating the upper point first, then reversing the paper and smoothing the lower point. The paper should be held perfectly horizontal. The adjusting screen

should be turned down so that the points grip the paper exists. It is a suit of the paper of the

RADIATOR CAP DEVICE.

The commercial vehicle is subject to constant vibration over the first possible population over rough pavements, and if the driver is careless in replaning the radiator cap after replenishing the cooler with water, the cover is apt to jar loose and be isot on the road. These members are more or less expensive and to prevent their loss may be fitted with a safety device such as illustrated at Fig. 2. A. These are inexpensive and may be constructed by anyone possessing a slight knowledge of the use of the soldering iron.

A small length of chain is attached to a loop or ring and the latter soldered to the cap. The other end of the chain is equipped with a bar and this should be slightly longer than the diameter of the opening in the cooler. The function of the bar is obvious. When it is dropped into the radiator its length being greater than the size of the opening it cannot be withdrawn while in a horizontal position. In the event of the cap working loose, it will be held by the chain and the attention of the drive will be drawn place before the piston has reached dead centre and sometimes this advance is more marked. Owing to the fact that there is no lag in the action of the current as with a coil, it is obvious that a backfire is brought about more easily. If the carbureto be adjusted properly and there is no leak in the intake pipes, a true high-tension magneto will start a motor on a quarter-ture of the starting crank.

TESTING EMERGENCY BRAKES.

It is an excellent idea to try the emergency brakes occasionally to note if these members are working properly. Some drivers blink that because they hold enough to prevent the car from moving after it has ecome to rest the brakes are in perfect order. They should be tested while on the road and if they do no grip well should be adjusted. Sometimes the members have been dragging, wearing the lining to such an extent that when the lever is moved the triction set up is not sufficient to check the momentum of

LIGHT HAMMER BEST FOR RIVETING.

Rivets are commonly used in relining brakes, clutches, etc., and the novice is apt to select a heavy hammer for peining over the head, wondering why he is not successful. The proper tool is a light hammer with which a number of

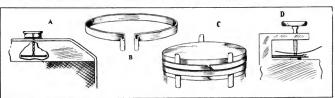


Fig. 2—Some Hints for Operators: A, Safety Device to Prevent Loss of Radiator Capt B, Piston Hing Ciamp; C, I fillising Old Hacksaw Blades to Remove Piston Rings; D, Truing 1 p Call Points with Emery Paper,

to the member by the rattling of the cap against the radiator.

STARTING ON MAGNETO.

The majority of commercial vehicles are equipped with a dual lightion system, this consisting of dry cells with a dual lightion system, this consisting of dry cells or a storage battery and a magneto. When the latter is of the true high-tension type care should be excreted when attempting to start the motor with this member. The astrating handle should be puided up smartly, and this should be done with the left hand if the operator be right handed. Some drives who spin the starting ranks make it a practise to push down with the right hand, imparting a rocking motion to obtain inertial enough to swing the handle over, in other words, to overcome the resistance of the commerciation.

This is dangerous as owing to the construction of the magneto the current generated and built up reaches its maximum at a certain position of the armature and if the sauring handle be rocked far enough a spark will cross the gap at the spark plug, exploding the mixture before the platon reaches the top of the compression stroke. The result will be what is termed a backfire and the operator is liable to be injured.

Magnetos are generally so timed that the spark takes

light blows are struck, spreading out the end as desired. If a rivel were held rigidly in a tight hole a heavy how would expand only the projecting end, but it is not usually so held, and the tendency of the heavy hole is to display and force apart that which is desired to bring together firmly.

HANDY SPARK PLUG BRUSH.

In cleaning apark pluzs it is customary to utilize a brush with still bristles and agasoline. These members may be purebased at a supply house and are inexpensive. A handy brush may be made, however, by taking a small piece of .23-inch brass or copper tubing and bristles from an old brush. The bristles are inserted in the tubing and the ends of the latter counterseed.

CARE OF LUBRICATORS.

The lubricating system of the motor should be given care and cleaned overalonally. The majority of the makers fit screens for the purpose of filtering the oil and these members become clogged and the flow of the full affected thereby. In cleaning the lubricators these screens should be removed and inspected, and if dirty washed with gasoline and replaced at the same time the crankease is cleaned



During the Chicago commercial vehicle show the Waveley Company, Indianapolis, Ind., received word from its New York representative that an order for 10 light delivery wagons had been placed by the Fleischmann Company of total city. A few days later a repeat order was taken, making a total of 20 contracted for by that company. The order was placed after long exteriment with a Waverley in competition with other types of vehicles, and the maker naturally was elated.

The light electrical transport is adapted for the yeast industry, as many stops are made in delivery, and the simplicity and ease of operation appeals to houses which maintain several vehicles for distributing a large number of packages in certain areas.

in the accompanying illustration is depicted one of the cars ordered by the Frieschman Company and these are manufactured in two models, of 600 and 1000 pounds carrying capacity, respectively. The lighter machine has a length over all of 125 linches with a wheelbase of 87 linches. The inside body dimensions are three by four by five feet, Wheels, both front and rear, are fitted with 32 by 25linch solid Firstone tires. The batteries are constructed in



One of a Fleet of 20 Light Belivery Electric Vehicles Recently Sold to the Filehedmann Company, New York City, by the Waverley Company, Indianapolis, Ind., Through its New York Representative.

small units making for easy handling and these are the 28-cell type, 13 MV Exide Hycap, the same size Waverley or National. The maximum speed is 15 miles an hour and the mileage on one charge of the batterles from 50 to 80 miles, this depending upon the roads.

The motor is 60-voit and drive is by shaft. A continuous torque controller is utilized with four speeds forward and reverse. Two sets of brakes are provided, both expanding, on the rear wheels and countershaft. Full elliptic springs are fitted both front and rear and the front axie is of the 1 beam section type while a full floating type is utilized in the rear. The frame is of armored wood, and roller bearings are employed. Control is at the left and the vehicle is equipped with storm front and side curtains with celluloid windows.

The Edison Electric liluminating Company of Boston is erecting what is said will be one of the largest garages in the country on the old Boston College athletic field on Massachusetts avenue, and the structure is to be a part of the sacretime representation of the company is soliding. It will dispert service plant that the company is soliding. It will have a face Massachusetts avenue at a slight angle and will have a depth of nearly 340 feet and the training that the training that the training that the training the sacretime should be selected by a wall. Originally it in for a stable and the rear for a garage, but before ground was the note that the sacretime should be sacretime to the sacretime should be sacretimed to the sacretime should be sacretimed to the sacretime sacretime should be sacretimed as the sacretime sacretime

The front building will be used for gasoline vehicles and will provide accommodation for about 50 cars, it being about 110 by 80 feet. The ground floor will permit of the storage of 30 automobiles and all of the modern facilities for washing, poliabling, etc., will be installed. The second floor will be devoted to the use of the drivers and their floor will be devoted to the use of the drivers and their equipment, and in addition will provide space for about 20 vehicles. The repair and paint shops will be lorsted on the third floor and will be completely equipped for the care and maintenance of mechanical transports.

The electric garage will be 110 feet wide and about 250 feet deep, all on one floor with entrances on the sides and conds. It is stated that four rows of machines may be stored easily besides providing pienty of space for working around the cars. There will be the usual facilities for washing, etc., and modern equipment for charging batteries as well as apparatus for removing and replacing these members.

The stock building of the company is to be located next to the garge on one side and here all suspiles except the heaviest will be carried. There will be a street between the heaviest will be carried. There will be a street between the heaviest to be a street between the first between the first between the street will be carried in the first between the street with gians, the street with gians, the greatest distract, much of the loading being done at night, so that each automobile will be ready for service in the morning.

Four doors in the side of the garage provide means for the machines to run across the street to the loading plantforms of the stock building. Beyond the latter will be another structure in which heavy parts will be stored. The group of huildings will be supplied by electricity from a transformer station beyond the second stock structure. Merchandise will be received from the railroad by a spur track. It is expected that the plant will be ready for occumpary late this year.

The Revere Rubber Company, Revere, Mass, is replacing its horse drawn equipment with the more modern mechanical transport and has placed an order with R. M. Thurber of the Boston sales office of the General Vebicle Company of Long Island City, N. Y., for a fleet of 3.5 and five-ion trucks. These will be utilized for transporting leavy loads between the factory at Revere and Boston. Mr. Thurber, who secured the order for which competition was unusually keen, is very nuch elated with his success in placing electric vehicles.

Announcement is made by the Baker Motor Vehicle Company, Cleveland, O., that William P. Kennedy, the well known consulting electrical engineer of New York City, will act as superintendent of the bureau of service efficiency for that company. Mr. Kennedy has for some time been affiliated with the Cleveland concern as its consulting transportation service engineer. He has had a broad experience and possesses a deep knowledge of the subject.

belivering electric meters in a large city is a difficult and delicate task but the problem of safely transporting these members, which have to be handied carefully owing to their finely balanced mechanism, has been solved by the New York Edison Company of New York City, which concern maintains a fleet of electric vehicles. In the accompanying illustration is depicted three of the numerous craw utilized by this company, and these are betroits, made by the Anderson Electric Car Company, Dertol.

They are stock models, but an interesting feature of the body construction is the fitting of neas for carrying mean. The The latter are injured easily and the company formerly utilized rubber matting to absorb the road shocks and to eliminate; wheating has a tendency to cause the meters to register Inaccurately.

The idea of constructing compartments or nests was originated by a member of the meter department who noticed a baker's wagon in which the pies were carried in separate compartments so built that the pastry was field securely. The plan was copied and the bodies of the automobiles were fitted with racks on either side of an alley way. Each compartment was fitted with a cushion which covers the floor and part of the walls and drops over the sill, so that once a meter is piaced inside it is aske and secure. Each machine

are well mounted, of special design and liberal area.

The drive of the first reduction is by Renold chain and second by roller chain. The gear ratio is 11.5.5 to one. A continuous torque dram type of controller is employed, the contact fingers of which are held under tension by laminatical springs. The reverse switch is the improved laminated type, mounted with the controller and an interlocking device of simple construction is fitted, preventing the possibility of the driver "bucking" the motor, it being necessary to bring the controller into neutral position before changing the current directions. Oliers are provided at all bearing points.

The brakes are two in number, located on the rear wheel hubs and counterstaff, and operated by pedia. The front survivels are 34 inches in diameter and rear 35, these being sitted with Timben bearings and the solid tires are 34 by 16, 25 inches front and 36 by four rear. The wheelbase is 96 inches, tread 42 and road clearance 11.5. The overall distincted, tread proposed and the solid paper size of the size of t

A Sangamo ampere-hour meter is a part of the regular equipment. This instrument is a regular battery gauge,



Trio of Detroit Electrics, Made by the Anderson Electric fur Company, Detroit, in Service with the New York Edison Company—The Bodies Are Equipped with 42 Nexts for Transporting Meters,

carries 42 of these nests in addition to the equipment for installation.

The New York Edison Company formerly divided the island of Manhatta hat there districts with a meter store-liouse in each and all meters required were transported from the main station at West 29th street. This system was abolished as were the branches, this being made possible by the me of the eleveric automobile. The main station was retained and this has a capacity of 20,000 meters, these-being transported by the machines, which are loaded in the ofternoon and start out the following morning, delivering directly to the different jobs abend of the writing eres. This saves considerable time in the installation and the customer is benefited thereby.

The machines employed have a carrying canotity of 2000 pounds and weigh approximately 4500. Edison hatteries of nickel and steel construction are utilized, these being free from sulphation, leaky jars, and are not affected by the ubration set up in traversing rough roads. These have 50 cells with the Edison A6 for light and A8 for heavy service. The normal voltage of the motors, which are of the series wound type, is 70, and the normal amperage 48. Hess-Bright numular bearings are employed, and the brushes and gives correct information as to the current the hattery contains, also affords opportunity for daily records. The new Veeder geariess hub odometer is furnished, also such extras as inspection imp, tools, etc.

That the electric vehicle is meeting with favor with express companies is noted by the large number of orders being placed with the General Vehicle Company, Long Island City, N. Y. Many of the purchasers repeated their orders and an instance of this kind is noted in the case of the American Express Company, which placed a number of trucks in service at its Boston department. In addition a contract was made with the General Vehicle Company for 25 3.5-ton trucks for the New York branch. This large order was followed recently by another for 20 two-ton and three 3.3-ton machines, which will be utilized in one of the cities. Among the express concerns repeating orders is the Adams Express Company, which recently contracted for a large number of electrics. The New York Transportation Company, which is known to many as Dodd's Express, has repeated its order for three 3.5-ton trucks.

Figures showing the actual performance and cost of

commercial vehicles are of interest to those contemplating the installation of the mechanical transport. The Baker Motor Vehicle Company, Cleveland, O., has, through its transportation service department, compiled figures showing the performance of a feet of eight electrics in service with a large department store. The data comprise a daily chart of the service afforded and its total cost for two months by days, the cost being operating expenses, plus depreciation, linearnee, repairs, interest on lineviennet, etc. The months taken were November and December, the former when the machines were operating under normal conditions, and the latter during the holidays. During November the cars averaged 55 miles daily and the average of package delivered daily was 164, and at a cost of 4.03 cents a package.

During 26 days of service in December the machines averaged 35 miles a day, deviaved an average of 247 panel, ages and at a cost of 2.7 cents each. The largest number of deliveries made in one day was 401, and 34 miles were travsited, while the biggest milesge was 50, when but 195 packages were delivered. The figures follow.

		No.			No.
	Mileage			Milenge	
Nov. 1	34	169	Dec. L.	- 3.1	164
Nov. 2.	37	172	Dec. 2	. 10	174
Nov. 3	. 35	153	Dec. 3 .	6.7	153
Nov. 4	31	170	Dec. 4	1.2	142
Nov. 6	45	145	Diec. 5 .	. 30	195
Nov. 7	27	20%	Dec. T.	31	20%
Nov. 8.		142	Dec. 8	. 27	227
Nov. 9	. 33	167	Dec. 9	30	240
Nov. 10	41	120	Dec. 10	41	241
Nov. 11.	36	123	Dec. 11	.1.3	198
Nov. 13	34	175	Dec. 12.	38	2014
Nov. 14	4.1	150	Dec. 13 .	. 30	260
Nov. 15	30	213	Dec. 15	. 27	314
Nov. 16.	22	230	Dec. 16		348
Nov. 17	32	214	Dec. 17. ii	4.4	261
Nov. 18	46	17.1	Trec. 19	25	309
Nov. 20	34	145	1 No. 20.	. 26	332
Nov. 21	37	143	Dec. 21		280
Nov. 22	35	210	Dec. 22	1.0	126
Nov 23	. 40	121	Dec. 23.	21	263
Nov. 24	37	135	Tree, 24	54	4+17
Nov. 25	34	163	Dec. 27	12	307
Nov. 27.	32	112	Dec. 28	45	200
Nov. 28	30	17.1	Dec. 29	. 43	209
Nov 29		150	Dec. 30.		175
			Dec. 31.		117

Day Baker, New England manager of the General Vehicle Company, Long Island City, N. Y., stated recently that few people in business life realize the volume of husiness being transacted in the truck line in Boston. He says: "The husiness public has decided to do its transportation by commercial vehicles, and while the truck is far more economical than any other form of transportation, especially if its form and size be adapted to the particular work, the husiness man will utilize mechanical transports regardless of the economy of operation. Automobiles are in line with the progress and spirit of the age, and the public is bound to have them, both the electric and gasoline types. The electric vehicle solves the transportation problem in cities and towns, while the gasoline machine is adapted for the long hauls over suburban roads. In cities, the former type is handled more easily and the cleanliness of the electric appeals to many. The recent exhibition at Boston will bave a very potent influence upon the commercial vehicle transportation in New England.'

Following the example of Boston, the railroad authorities at Springfield, Mass., have decided to try an automobile baggage truck operated by electricity. The experiment proved so successful in the former city that the vehicle was shipped to Springfield for a trial and if it demonstrates its practicability, as it has in a number of cities, will be made a permanent fature. The machine is known as the double decker type having two surfaces 42 by 55 liches, one above the other on which haggage may be deposited. It has a hack which may be used for anoliter extension of the loser plane to a trile over 10 feet. Its carrying capacity, 2000 to 4000 pounds, is considerably greater than that of the ordinary hand trucks and it has a speed which can be regulated from lwo to 10 miles an hour.

The Baker Motor Vehicle Company, Cleveland, O., maker of Baker commercial and pleasure vehicles, is issuing a neat folder in colors which depicts a ficet of 50 cars in service with the American Express Company of New York City.

The city of Alliance, O., is a progressive municipality, and conducted a series of experiments with the different types of automobiles to secure a vehicle best adapted for a combination police patrol and ambulance. The committee in charge of the tests decided upon the product of the Arcs Electric Vehicle Company, Saginaw, Mich., maker of electric commercial and pleasure vehicles of all trues.

REPEAT ORDER FOR SAMPSON TRUCK.

After experimenting with the motor propelled vehicle for 15 months, the Mosler Safe Company, New York City, has ordered a second machine which will be similar in every respect to the first car. The Sampson power waxon, made by the Aiden Sampson Manifacturing Company, Detroit, a constituent of the United States Motor Company, New York City, will be fitted with Windlasses operated by the power of the motor, enabling the crews to lift the heaviest safes in nuch less time than with hand power.

COAL DEALERS DISCUSS MOTOR VEHICLES.

The Maine Coal beaters' Association held its annual meeting recently, at which the various cities and towas were represented. A feature of the session was the address upon mostern methods of bandling coal by W. A. Clark, president of the New England Coal Dealers' Association. The practicability of the mechanical transport was polared out by the speaker, and the various loading and unloading devices outlined.

BARKER HEAVY DUTY TRUCK.

Charles L. Barker, Norwalk, Conn., maker of martie and stationary gasoline motors, is now manufacturing three and five-ton commercial vebicles which are to be known as the Barker Heavy Duty truck. Of the design is emphasized its simplicity, durability and accessibility. The power plant is stated to be sufficient to handle the heavier of loads. The clutch is a multiple size and the transmission provides a direct drive on the second and third speeds. Final drive is by chain, fully enclosed. A feature of the design is a dash fuel tank with emergency member.

G. M. C. FOR QUICK TRANSPORTATION.

The keen business man can find many ways of saxing time when supplied with the modern motor truck. Gleeson Murnby, vice president of the General Motors Truck Company, Detroit, cites the Instance of a contractor in Natick, Mass., who owns a 3.5-ton G. M. C. truck. Instead of wairing for teams to move his tools and other building material, and seading his men on the next job by train, be simply loads the entire outfit into the vehicle and away he goes. Recently, he moved his equipment and men 24 miles and was on the new job in three hours. On another occasion, he finished some work at 2 in the afternoon, loaded his men and tools, shifted to another city 75 miles away, and began work on the new job the next morning at 7.

A THE WAS PERSONAL PROPERTY OF THE

RECENT MOTOR VEHICLE PATENTS



Hunt Motor Truck.

Charles W. Hunt, deceased, New York City, has been granted a patient for a motor truck consisting of a driving axie and wheels, a carrying axie and wheels and a frame. Motor frame is independent of usual frame member and has a two point bearing on the driving axie and a single point bearing upon the carrying axie, extending beyond the driving and easy from the carrying members. The motor is mounted upon the extension and its weight acts upon the driving axie with a minimum beyenge.

Lent Fire Engine.

An automobile fire engine has been patented by Leon B. Lent, Brewster, N. Y. It is similar to the usual fourcylinder pleasure motor car with the exception that a rotary pump is mounted amidships on the frame. The transmission is fitted between the main driving shaft and rear wheels, and a shaft operates the pump member by a wheel which serves as a flywheel for the motor. The impeller is permanently mounted upon this shaft which also serves as a driving member for the vehicle.

Long Horn.

An automobile form which is operated by hand has been invested by Robert E. Long, New York City, to whom a patent has been granted. It is similar in shape to horns having a dispharatus and the plunker rod may be fitted at the top or end. When this member is depressed it actuates as sear which in turn operates another toothed member engaged with a number of striking members, these earry-ing several halls rotatively mounted in perforations adapted to strike on projections rigidly mounted on the disphragm when a weighted rotary disc in its vicinity is operated.

Bishop Muffler.

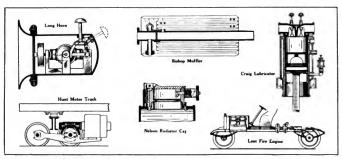
George Arthur Bishop, Leeds, England, has been granted a patent for a muffler which comprises a gas injet pipe surrounded by a series of annular chambers with closed ends and so arranged as to prottice cooling spaces between them. Inlet and outlet ports are provided near opposite ends of these chambers, also radially extending tubular distance pieces connecting the outlet ports of the pipe with the linet members of the first of said chambers, and radially extending tubular distance pieces connecting the outlet ports of each chamber, except the outer one, to the inlet ports of the next adjacent chamber.

Craig Lubricator.

A device for lubricating the wristpin of a pision baseen invented by James Craig, New Rochelle, N. Y. Lubricant is supplied by a cup through a passage in the cylinder wall to an annular cavity in the pision. The fluid is led through a port to a groove in the wristpin which is fitted with a chamber and means are incorporated for lubricating the upper and lower surfaces of the pin.

Nelson Radiator Cap.

When an operator of a commercial vehicle is careless in replacing the radiator cap after replenishing the supply of fluid, it is liable to be lost owing to the vibration set up in traversing rough roads. Edmund B. Neison, Cadiz, O., bas invented a radiator cap which presents many practical features inasmuch as its construction is such that the member cannot be lest and considerable time is saved in filling a cooler as unscrewing the cap is avoided. The device consists of a lid pivotally mounted or hinged and fitted with a spring for the purpose of throwing the lid open when the spring member is released. The latter is concealed and attached to the lid is a perforated lug extending downward into which fits a spring actuated pin. This is provided with a cam face mating with a similar member of the cylindrical casing whereby when the knurled head of the pin is turned the pin itself will move outward, releasing the lid.



FOREIGN TRUCK NOTES OF INTEREST

WHITE TRUCK IN CHINA.

The progressive ideas with which the present government of China seems to be imbuted are expected to result in opening a decidedly successful market for all types of modern equipment, including, of course, the pleasure and commercial automobiles. Pleasure care have been in more or less containt service in certain sections for some time, but it is only recently that motor trucks have been seen in

Among the first was a White, made by the White Company, Cleveland, O., one of the vehicles utilized by the United States army in the Philippines. When the American forces were sent to China during the recent distribunces, they were accompanied by this machine, which was fitted for all emergencies and did excellent work in connection with the troops of the alliled forces.



White Truck Which Accompanied United States Teoops to Northern China Daring Disturbances in That Country Recently.

An accompanying illustration shows the car upon its arrival in Chin Wang Tao, North China, as it was being prepared for its journey inland. An might be expected, it attracted considerable attention from the natives, and it bardly need be mentioned that the Chinese business men found opportunity to watch its progress in the difficult task before it.

SPLENDID MARKET IN JAPAN.

The business men of Japan have been investigating the tocommercial vehicle with the result (that they are rapidly becoming convinced of its thorough practicability and efficiency. The roads in that constry are not use as to indicate the most successful operation of mechanical transports, but the government is committed to a policy of the remedying these conditions as rapidly as possible. Several entry of the property of the property of the property of the very satisfactory results, and the Japanese are about prepared to purchase in increasing quantity.

Vehicles destined for use in Japan should be capable of hard wear. The roads in some of the mountainous dis-

tricts are exceedingly bad, and there is a decided scarcily of experienced chauffeurs and mechanics. On account of the narrow city atreets, cars ought to have short and narrow bodies, easily steered front wheels, atroug brakes and durable rubber tires. The manufacturer who develops this field in the proper manner is sare to secure a permanent market.

PROPOSED SOUTH AFRICAN TARIFF

As chronicled in these columns recently, business meta and farmers in South Africa have become convinced of the utility of the motor vehicle and are prepared to purchase and a satisfactory scale. Closely following this Information comes the news that the Union Parliament of South Africa thritish practically has agreed upon a polley to impose a tariff on all motor vehicles shipped to that seventially the state of the second of the second close to the second close to the second column of t

STREET CLEANERS IN PARIS.

As a result of the recent tests conducted by the city of Parls, France, 30 combined motor watering carts and state sweepers have been purchased from the De Dion-Bouton company. The chassis of these machines will be the relation 18 horsepower type, so generally used on the Continent

TAXICABS IN BRAZIL.

Germany has been decidedly successful in developing trade in South America, as is evidenced by the recent order for 35 taxicabs received by the Neue Automobil Gesellicabil from a concern operating in Rio de Janeiro, Brazil. These vehicles are of the open type, seating four passengers, and are constructed on the regular N. A. G. 12-14 horsepower. four-cylinder chassis.

FIRE APPARATUS IN IRELAND.

The police committee of the town council in Relfast. Ireland, has approved the report of a sub-committee recommending the expenditure of practically \$50,000 in the purchase of modern motor fire fighting apparatus. The plan embraces the entire replacement of the present endipment of borse drawn vehicles, including the steam fire engines.

MOTOR MAIL WAGONS IN BAVARIA.

Beginning last month, a new motor mail line connection. Nuremberg and Eriangen in Bavaria was opened, coversia a distance of 11 miles. The city of Nuremberg has gustanteed the success of the enterprise to the amount of practically \$500, other interested commanities bearing the cost of constructing and maintaining the requisite garages. The municipal authorities of Dachau are interested in a similar proposal concerning a line to Odelshausen.

ELECTRICS IN AUSTRALIA

The city of Melbourne, Australia, has decided to import one or more electrically driven motor vehicles for use by the municipal authorities. This is a type of machine which has been given but little trial in the commonwealth, and many iusiness men are watching the innovation with considerable interest. The Australian market has been decidedly active for gasoline trucks during the past year, and it would appear that manufacturers of electric vehicles would do well to watch the experiment under the direction of the Methourne officials

MOTOR HAULAGE IN PATAGONIA.

Owing to the scarcity of grass in southern Patagonia, it is impossible to employ the bullock teams, and those who have been engaged in developing this country have been making tests of motor transports for some time. Practically the first machines imported into this country were two gasoline tractors of American manufacture. The rough roads and the light construction of the vehicles proved to be a combination which did not result satisfactorily. However, a machine of the same make and type is still in use in that country, although the con-

sumption of fuel is admittedly very high

The Sociedad Explotadora de Tierra del Fuego uses steam tractors on its Ultima Esperanza section with success. Another successful machine is a Fiat, which has been working there for about three years, making frequent trips to Rio Gallegos and Guer-Aike, a distance of 21 miles, and carrying three tons each way,

Two British vehicles, a steam Mann and a gasoline Marshall, are also being used in the same territory. The first operates at a rate of seven miles an hour with a seven-ton load, while the latter frequently makes trips to Guer-Aike, drawing loads up to 25 tons.

it would appear that an excelient field might be developed for specially constructed machines.

Respite the absence of grass, other crops are grown easily, and the farmers of that section are anxious to obtain some satisfactory means of handing their products to market.

AMERICAN AMBULANCE FOR BRAZIL.

An accompanying Hinstration presents a Pope-Hartford ambulance, made by the Pope Manufacturing Company, Hartford, Conn., for use in Rio de Janeiro, Brazii. vehicle is much the same as those which have given exceilent satisfaction at home. The inside equipment includes beds, stretchers, medicine chest, folding seats for surgeons and nurses, speaking tube from surgeon's seat to driver's seat, and two dome electric lights in the roof

The chassis is fitted with a 50 horsepower motor. Wheelbase is 136 inches, tires 38 by 5.5 inches in front, and 39 by six inches rear, with demountable rims. The body is of wood, having a floor space of 38 by 93 inches, with inside height of 58 Inches. The roof and inside walls are finished in mahogany, with doors on either side and double doors in the rear. These latter have double locks, operated from either inside or out, and each door has a plate glass

window 13.5 by 22 inches. Springs are of the finest quality, giving comfortable carriage of the sick and injured.

GERMAN SERVICE IN AFRICA.

Work is progressing favorably on the proposed motor truck line between German East and West Africa, across the Continent and through the Belgian Congo. Considerable construction will be necessary, and a new road must be cut through forests and mountainous country, and bridges thrown across rivers, before the vehicles will be able to make the trip

NO HORSE CABS IN BERLIN.

Beginning April 1, no more horse cabs will be allowed upon the streets of Berlin, Germany, in compliance with an edict issued by the police authorities of that city. It is maintained that the vehicles in question have become so utterly obsolete as to be wholly unworthy of such an upto-date city as Berlin. To each of the 60 licensed drivers affected by the new regulation \$150 has been paid by way of compensation, and it is announced that their application for permission to operate motor cabs will be considered



Cope-tineiford Ambulance Recently Shipped by Pope Manufacturing Company to Rio de Janetro, Brasti,

favorably. This is a step which will be watched with interest by other Continental countries following closely the example recently set in Paris.

AGRICULTURAL TRIALS IN FRANCE.

The recent agricultural trials in France were not as successful as those in charge had auticipated. The difficulty appears to have been in the failure to attract a sufficient amount of competition. It is announced in this connection that the Societe Nationale d'Encouragement a la Agriculture, having former President Loubet at its bend, will undertake the holding of an important agricultural motor congress in 1913, and that manufacturers of farming implements in all countries, not only will be invited, but urged to compete

A considerable competition is expected in connection with the trials at Bourges from Sept 25 to Oct. 6, under the auspices of a committee, of which Prince Pierre D'Arenburg is chairman. All particulars are to be obtained from the office of the commission, 14 Avenue de la Gare, Hourges, Cher, or from the secretary of the agricultural committee of the Automobile Club de France, Paris

SOLVING THE QUICK LOADING PROBLEM.

Interesting Device Developed for Application with Horse Drawn Equipment, Which May Be Utilized with Satisfactory Results in Motor Vehicle Haulage.

THERE is little disposition to dispute the fact that until the appearance of the practical motor truck, few operators of home drawn equipment gave the attendion to the matter of economical and efficient haulage that its importance warrants. This applies equally to the man who is compelled to rely inpon others for the solving of his transportation problem and to those who are engaged solely in the matter of haulage. Only those who have made attempt to gain information upon which to have comparison between the relative cost of mechanical and horse drawn equipment can appreciate the full force of this statement.

Many men hestiate to adopt newer methods in this branch of their business, ingrejs because they are not well informed as to the cost of their present facilities. Draught animals have been employed in halling materials and goods for many years, but there practically are no data available from which it is possible to learn whether or not their use is cesting more today than 50 years ago, for instance.

When the motor track salesman first approached the

Chute Company, Birmingham, Ala., primarily for the benefit of horse owners. Ample demonstration appears to have resulted in increasing the efficiency of the horse wagon by nearly 100 per cent. There seems to be no reason why the same equipment should not work similar, if not more favorable results with motor vehicles.

As indicated, the white is designed for attachment to cars or bins for the handling of coal, grain, etc., but there are numerous other uses to which it might be put with equil success. Line drawings iscrewith give a clear idea of the construction. It is made of steel and angle from and is so designed that it may be hooked to the top of the car by means of two large hooks, which may be attached to the bottom frame of ciute at three different points, according to the size of the vehicle to be loaded.

Depending upon the relative heights of the car sides and the wagons, the chutes are adjusted with a chain, by hooking up which the front of the chute is raised, and by letting down it is given greater inclination. It is necessary



Quick Loading Chate in Operation: At Left, Team Beginning to Take on Load; at Hight, Wagon Pully Loaded,

business man It was with the argument that be could effect economy. Careful compilation of figures for a given period, based upon the amount of work that a particular vehicle could perform in conjectition with horses, proved that this was true. But the business man often failed to become convinced, even with the figures before him, and the reason is to be found in the tirem of efficiency.

It matters little that a mechanical transport can accomplish more work tian horses, if it is not to be worked as something like the limit of its efficiency, it is only under use such conditions that it is able to show the maximum economy, and with certain tines of business this becomes a decided problem in Itself.

The successful competition of the motor truck has occasioned considerable more thought with respect to the transportation question, even with those who for one reason or another feel compelled to continue with horses. The careful compilations which have been made in recent yearhave served to inform the business man as to what his horse drawn vehicles should cost, and there is no doubt that this agitation has resulted in endeavor to secure ways and means of improving their efficiency. The owner and prospective purchaser of mechanical transports can learn much from a consideration of some of these innovations,

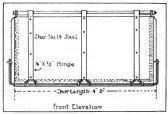
In accompanying illustrations is presented a quick loading chute, which was produced by the Quick Loading Car to fit the hooks securely to the top edge of the car, and not to let the eads rest on the contents. If the car be full space should be cleared for this purpose. The curved part of each hook must be in close contact with the edge of the car. If those precautions be taken, the chute is said to be able to sustain double its rated canacity.

The method of use is obvious from the photographs. Two or more of the chutes are attached to the side of the car or cars, and a man is detailed to fill each. The wasen is placed in position underneath and trap is sprans. As many chutes are dumped as are needed to fill the vebile, and while this load is being delivered, the men have opportunity to refill the chutes.

By this method, it is possible to discharge the contents of a chute into the wagon in 10 seconds. Assuming that it is necessary to utilize the contents of two chutes, the vehicle is detained less than a minute and may be on its was to delive; the load

Not only is time saved on the part of the wagon or true?, but there is no wasse time on the part of the men who do the shovelling. Under the old arrangement, the men are forced to remain idle during the periods when no wagon is nawiting a load at the car. With the new plan, the men are always busy, and the teams are moving all the time. There is no waiting for wagons and no wagons waiting for loads.

Still another item enters into the consideration where these devices are used in connection with unloading railroad cars. As is well known, railroad companies are continually



Brawing Indicating Construction of Quick Loading Chute,

demanding the use of their rolling stock, and in order to insure that they shall have such use so far as possible, demurrage charges are collected after a stipulated time, if a consignee is unable to release the car. Any method which will make for quicker work in unloading the contents of a car lessens the possibility of demurrage.

That this is by no means an unimportant consideration, is the heter understood when it is stated that many contractors throughout the country are called upon frequently to move from 10,000 to 13,000 tons of one class of bulk freight at a time. More than 250 concerns in 35 states are using the chures described, as well as many in Canada and the linular possessions of the United States.

Chutes are made in three standard sizes as follows: Capable of holding .75 cubic yard, shipping weight, 216 pounds; one yard, 285 pounds, and 1.5 yards, 324 pounds. The drawings present the exact proportions.

BUSINESS MEN AND TRUCKS.

"The pleasure automobile has been in the foreground long enough," declares T. R. Lippard, vice president and manager of the Lippard-Stewart Motor Car Company of BUHfalo, N. Y. "In the automobile business we have sense of the reversal of the old moto, 'Business hefore pleasure.

"The pleasure car got the start because it ministered to the pleasure-loving instincts of the people. The motor truck was meant for husiness purposes, and business men are conservative.

"The merchant who hought a pleasure car and careered ajoustly through the country is slow to contemplate the abandonment of horses and wagons for the transportation of his goods. The change would involve expense. He would involve expense. He will have to dispose of the plant he has, at a sacrifice perhaps, which certainly would be more country at the outset.

"But he is gradually becoming converted. Though the initial cost of a motor truck may be greater, it is an untiring serrant. Unlike the horse, it can work sil day longit is never so galled and footsore that some humane policeman has to order it back to the stable, and it does not obstruct the street like the horse and wagon.

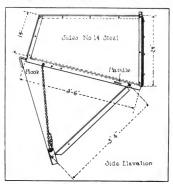
"The public is interested in the motor delivery car, because it will reduce the traffic congestion in citica about 20 per cent. That ought to, but may not, appeal forchly to the merchant. The saving in money through the motor vehicle must appeal to him mightly, when he has been made to see it."

G. M. C. TRUCK AIDS FACTORY.

The superiority of the commercial vehicle over all other forms of transportation in the case of emergency was demonstrated recently at the plant of the Spink Manufacturing Company in Philadelphia. The power plant was put out of commission by the breaking of a large cylinder and a new one could be procured only at Newark, N. J., a distance of 95 miles. Not wishing to tie up the factory while waiting for the machinery to be shipped by the usual methods, a G. M. C. truck, made by the General Motors Company, Detroit, was dispatched with a crew to Newark. The start was made at 3 in the morning, and in spite of a severe rain and wind storm the car reached Newark at 2 in the afternoon, loaded on the cylinder and started the return trip shortly after 5. By this time the rain had changed to hail and the 3.5-ton machine encountered many difficulties on the return trin. In some places large limbs from trees obstructed the roads, compelling the crew to stop and remove them. The automobile arrived in Philadelphia at 1 in the morning, having covered a distance of 170 miles, and during the entire trip the car ran perfectly

FUEL ECONOMY IN OPERATING.

That there is a considerable difference in the amount of gaodine used by a vehicle when operated by a competent and an inexperienced driver was proven recently by a novel test conducted by William II. Stewart, Jr., of the Mais Motor Truck Company, indianopolis, Ind. In the first test the course was covered by a driver using the same judgment as the average experienced man. Then a man was placed behind the wheel and made to drive the same distance after being shown how to operate the ear as would be the case in teaching a new owner. The results were very surprising. The experiments showed that 34 per cent, more fuel was consanied by the inexperienced operator than was used by the regular driver. Of course, it will be admitted that



Illustrating Provision for Attaching Chute in Position.

the inexperienced man will soon be able to overcome this difficulty and no suggestion is made that it is necessary to employ experienced chauffeurs for motor truck work.

ELECTRIC CAMPAIGNERS BANQUET IN BOSTON.

Manufacturers Discuss Some of the Reasons Why This Type of Vehicle Has Failed of Adoption in New England and Suggest Methods for Increasing Its Use.

CELEBRATING the first anniversary of the beginning of an electric vehicle development campaign in Hoston, the Boston Electric Vehicle (tub held a banque in the Host Thorndike in that city early in the month, at which some 150 were present, including many prominent business men in Boston and vicinity, and electric vehicle manufacturers and dealers. The president of the clab, Day Baker, local representative of the General Vehicle Company, Long Island City, N. Y., presided, and E. S. Manafield of the Boston Edison Electric Illuminating Company was coastmasser.

P. D. Wagoner, president of the General Vehicle Company, spoke in part as follows:

"I think it must be conceded that when hundreds of the largest firms in the country officially adopt the electric for their city delivery service, they must consider it perfected, at least to the extent of heing superior to horses and more economical than non-electric trucks for this work. When I tell you that 100 firms already use 1909 electric trucks of one make-that two express companies have purchased no less than 356, two brewers 172, three packers 110, three delivery contractors 93, and three central slations no less than 158, and when you consider further that in the case of the express companies, the brewers and the central stations, many of the electrics now operated by them have been in service from six to 11 years, you must admit that such extensive buying not only voices confidence in the electric, but demonstrates as well that the electric truck gives a larger return on the investment than other types of commercial vehicles.

"This is certainly true of city work, and the bulk of heavy trucking and deliveries in the city. The fact that in changing from horses to electric trucks, you can utilize your regular horse drivers does much to simplify the operating and economic problem of the man who is adopting motor vehicles. Many of the horse drivers possess a valuable knowledge of the firm's routes and methods of delivery.

"I am not exagerating when I say that with about 48 hours instruction by a competent demonstrator, the average teamster can be taught to operate successfully a five-new teamster can be taught to operate successfully a five-corners without taking the lamp post with him, back lato corners without taking the lamp post with him, back lato therefore, most drivers are not only willing, but anxious to drive the electricies.

"We do not use electric light because it is cheaper than a tailow dip—it is better. Our competilor uses it—we must keep abreast of the times. Progress is essential and progress demands it. We do not use elevators because they are cheaper than walking. Modern conditions require modern equipment.
"Automobiles for pleasure and commercial nurmoses are

"Automobiles for pleasure and commercial purposes are going to he used regardless of economy of operation. Automobiles are in line with the restleasness, the progress and the spirit of the age. The people are bound to have them.

"The motor truck is a money saving proposition, yet the world is going to have it because it is up-to-date, a part of modern business. Electricity provides the solution of most of the transportation problems of our cities and towns. The people like electricity. It is a good, clean product. I how to that great silent forces.

Another speaker was William Kennedy, a consulting engineer retained by the Baker Motor Vehicle Company, Cleveland, O., who said in part: "It may well be conveded that after 10 years' successful employment in economic service the electric vehicle has ceased to be an experiment and is as well developed as most of the industrial apparatus which we are all present using 1n commercial IIIe, as absolute necessities to present day conditions. We may be well convinced or this when we consider that the electric vehicle, particularly in its indutrial application, is nothing more than a modification of the electric street car, having the same engineering foundation for its design and production.

"With the practical example of nearly 5000 commercial vehicles and over 15,000 pleasure whites in successifies in successifies in successifies in successifies in successified are not more universally employed, and the conditions teed-lig to obstruct their almost universal application are welling to obstruct their almost universal application are welling to obstruct their almost universal application are welling to obstruct their almost universal application are well propagation of their use as to establish in the minds of propagation of their use as to establish in the minds of propagation of their use as to establish in the minds of an inclination to substitute them for the present of establish of the substitute of the su

"A peculiar feature of the increasing business, however, is the fact, generally admitted, that for the past two years nearly 70 per cent, of the commercial vehicles put into service were purchased by firms aiready using electric trucks, so that the gain in new business seared by manufacturers represents only about 30 per cent, of their total outruit.

"This indicates two things, which are somewhat difficult to reconcile. One is that this type of machine is so economically successful as to warrant continual increase in the equipment afready in use, and the other contrasting feature is that notwithstanding this convincing example to the industrial and merantitie community it does not create a proportionate desire on their part to avail themselves of this economic apparatus.

"It may be interesting locally to know the fact that while there are between 4000 and 5000 commercial machines used elsewhere, Massachusetts is at the present time employing only 170, of which 87 are in Boston proper and 111 in Boston and its immediate vicinity; and the total for New England would probably not exceed 200 electrics while there appear to be in the same district 1800 gasoline commercial cars. The aparthy of the New England district is the more conspicuous in view of the fact that no corresponding territory has had expended upon it anything like the same amount of intelligent and persistent effort to educate the prospective users in the benefits to accrue from the use of these machines, as well as to attimulate effort on the part of those engaged in advancing the propagands.

"It this situation is to be improved we must broaden our clores and intic the co-operation of, not only those lumediately interested in the sale and use of machines, but ever other influence at work in promoting the employment of electric utilities. The more we encourage the public habit of using electric vehicles or electrical service in any form the more we stimulate the general interest with corresponding reflex individual headed to its various other divisions.

"The present impediment to progress in this direction is a lack of familiarity with the real simplicity of the problem. There is an inclination to surround electric vehicle employment with a good deal of unwarranted mystery and to lay, stress on minor non-essential items which may happen to be questionable at the moment, instead of looking broadly at the conspicuous advantage which machine use possesses.

"Among the greatest difficulties which we encounter in this work is an aimons complete absence of knowledge on the part of the users of horse service as to the cost of their transportation except in the few cases where the service is bired, or transportation is the principal part of the business, but until the advocates of motor vehicle employment attempted to make the substitution of machines for horse on an economic basis, it is a fact that reliable borse transportation costs were unknown to the average merchant. The necessity of this information is now being recognized by them and they are gradually informing themselves, although the subject is handled in a very crude way by most of them.

"Again, even where we find the prospective user inclined to consider machines favorably we discover a strong dis-inclination to change the method which has been convenient with the use of horress, to any new scheme of operations which may be necessary to utilize the capacity of the machine. There are also existing obstacles at loading and unloading points, which are the great causes of waste in any agatem, present or future, which must be eradicated be-

fore long as an economic necessity, even independent of the use of motor vehicles.

"We have several splendid advantages in presenting economic facts in relation to the cost of operating electric machines on account of the fairly accurate records which have been kept, particularly in large Installations over long period, covering upkeep of the wearing mechanical parts, balteries and tires, and these three essentials are after all the only items that are subject to the slightest doubt in presenting the cost of operation.

"For the purpose of putting some fact forward to subsimilate the generally accepted knowledge among us that remarkable economy may be effected by the substitution of machines for horses, the attached table is presented, showing the results of some very complete and exhaustive Invatage of the state of the state of time devoted to each case and adequate facilities afforded to arrive at an exact knowledge of existing horse cost and to demonstrate beyond question to the prospective purchaser the performance and the cost of operation of the proposed machine equipment. These cases are selected at random from a large collection and represent the transportation departments of prominent and well known commercial inalitutions is several of the principal cities. The names are omitted purposety as otherwise this information could not be presented.

"Two classes of service are covered in this tabulation. One representing haulage of heavy loads requiring vehicles of two and five tons capacity and the other group representing medium service where the vehicles are largely composed of ton and half-ton machines as well as some larger sizes in minor quantity.

The figures relating to horse equipment are certified to as correct by the respective owners of the installations and the machine equipment has been determined in every case after a complete consideration of the characteristics of the work and extended demonstration with the actual use of machines to prove that the expected accomplishment was practicable. These demonstrated results have been agreed to as convincing and saliafactory by the interested executives in every case, and therefore the entire matter is an nearly fact as it is humanly possible to develop it.

MOTOR TRUCK CLUB'S ANNUAL MEETING.

The Motor Truck Club in New York City is doing excellent work in connection with the correction of trade abuses. Many little practises which have stood in the way of complete barmony between buyers and sellers have been brought into disrepute and practically eliminated. This ia best exemplified by the fact that one member, a truck salesman, whose methods were held to be detrimental to the development of the commercial vehicle industry, has been expelled, and the principle has been established that the club stands for fair representation in the matter of truck salesmanship.

At the recent annual meeting, beld in the rooms of the Automobile Club of America, the following officera were elected: President, D. C. Fenner, manager of the Metro-politan branch of the International Motors Company; vice-president, Emerson Brooks, vice president of the Remington Standard Motor Company; secretary and treasurer.

COMPARISON	BETWEEN	HORNE	DRAWS	AND	ELECTRIC	EQUIPMENT.

Henry No. of	Service-		alment	F3	Densi-	Annual	Cent. in Earnings on the	Cent. Saved Over ttorse Ex-	
	Machines	Horse	Machine	Horse	Machine	Saving	ment	pense	
7.5	4.4	\$94,551	\$166,733	\$136,746	\$113,687	\$23,660	14.2	17.5	
20	11	26,615	36,5%1	44,19%	29,274	15,819	43.2	35.7	
16	5	7,975	17,784	15,5%7	11 557	4,030	22.6	25.8	
121	60	\$129,141	\$221,161	\$196,501	\$153,022	\$43,509	19.6	22 0	
Mediun	Service.	_							
35	31	\$36,455	\$53,883	\$94,500	\$70,663	\$79,867	25 0	23.0	
17	10	14,309	22.500	29,074	15,972	14,102	42.9	31.0	
33	20	21,545	51,126	50.219	15,444	88,895	23.0	23.3	
2.1	14	39,77%	16,170	11,593	31,842	9,791	21.2	20.5	
4.5	37	54,095	75,59A	115,254	33,315	39,339	52.3	31.2	
154	112	\$166,506	\$279,397	\$427,136	\$235,626	\$92,104	32.9	28 0	

Charles E. Stone, Hexier Motor Company; managerial board, F. H. Porter, Chasse-Motor Company; E. Lascaria, De Dion-Bouton; E. O. Hoopengarner, Swinehart Tire Company; A. N. Bingham, Hessiti; E. W. Curtis, Jr., General Vehicle Company; A. J. Siade, consulting engineer; John Hanson Kennard, Couple-Gear.

MAY HAVE AUTOMOBILE LINE.

While until recently very little effort was made to develop the sale of commercial vehicles in the Rocky Mountain district, the people of that section appear to be quick to realize the benefit so be obtained through the use of mechanical transports. The latest information indicates that a practical demonstration of the motor 'bus for cross country transportation is to be granted by H. M. Lamon of Mesa, Ariz, who has organized an automobile line to be operated between that city and Phoenix.

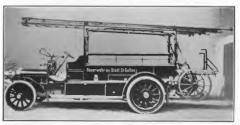
Cars are to be run on a fixed schedule, arrising and departing every two hours, from 7 in the morning until 11 at night. The fare will be five cents a mile, single mileage, although coupon tickets will be issued good for 500 miles at three cents a mile. Stops will be made at any point on the line, the same as with rulley cars, and it is expected that the farmers throughout the district will furnish a decidedly important share in the success of the vapture.

FIRE DEPARTMENT NOTES

It was announced recently by the International Motor Company, New York City, maker of Saurer, Mack and Hewitt commercial vehicles, that Saurer fire apparatus would be manufactured at its Plainfield, N. J., plant. In the accompanying liburation is presented one of the types to be made, this machine being in service at St. Gallen, Switzerland, the original bome of the Saurer automobile.

The vehicle is a complete piece of apparatus and is propeiled by a 56 horsepower motor. In a test at Bound Brook, N. J., a similar machine delivered a stream of water of greater volume through six lengths of 2.5-inch hose than steamers of that section could produce. Another test consisted of coupling four separate hose to the connections of the pumping device and it was shown that the streams were of good size. When connected to a city hydrant, where the water pressure was about 6.5 pounds, the pump drew this down to less than 30 and raised the pressure at Safestarge to 135 pounds.

The pump is of the centrifugal type and is said to be



Source Combination Hose, Hook and Ladder and Pumping Engine in Service of St. Lattee, Switzerland, Unpitentes of Which Are to the Manufactured to This Country by the International Motor Company, New York 12ty.

capable of delivering 550 gallons of water a minute at a pressure of 150 pounds. Two auction connections are provided for the purpose of taking water either from a hydrant or a stream. The pump is located at the rear of the chassis and is controlled by a hand lever.

Fire Commissioner Joseph Johnson of New York City, through whose efforts the horse drawn equipment to being replaced as rapidly as convenient, and who is perfecting a thoroughly efficient motor fire department, has adopted plans whereby a competent staff of automobile mechanics and drivers will be in constant readiness to perform the duties necessary to keep the equipment in active operation.

The commissioner's plans are entirely his own and were adopted after consultations with manufacturers and technical experts. The change involves the disappearance of the old drivers and engineers and to some extent the entire personnel of the department. To bring these conditions about and not to impair the efficiency of the department, a school of automobile engineering, was cetablished.

To motorize a horse fire department requires time, labor and experience, and with the material to work on, unfamiliar with motor propelled vehicles, the task has been unusually difficult. It is interesting to note, however, that of the 127 men who have been members of the school less than 12u, or 95 per cent, have graduated. Each of the 120 is not only equable of operating an automobile, but can assemble a motor and perform such duttes as are required of an ordinary automobile mechanic.

The school was started last September and no special qualifications on the part of the applicants were required. After being elected, the men are formed into classes of 28, and for the first 10 days be members are instructed in the simple radiments of motor construction. If during this time, any member shows thisself to be deficient, or, in other words, falls to grasp the details, he is sent back to this romans.

The term consists of 30 working days of six hours each. During this time each student is required to become familiar with asinor difficulties which might be encountered upon the road. After being admitted to the class, each member is presented with a list of 33 questions which are

explained in detail by the instructor. These questions cover the final examination, and must be answered in a satisfactory manner to secure a cerificate of graduation. In addition there are 300 questions covering the working of the motor, these being sui-divided and relating to operation and troubles of the components of the machine.

Applicants are received between the ages of 22 and 40, although exceptions have been made in some instances. The men report to their respective stations after 6 in the evening for regular duty. When the member is presented his certificate he is warned that his work will be watched constantly, and should anything occur to warrant it the certifi-

cate will be cancelled. This is done to maintain the proper efficiency of the department.

A feature of the school is the regulation of speedt on the city streets. The limit is 15 miles an hour, but many of the students desire to drive at a rate of 25 miles, and in order to guard against this Commissioner Johnson the the cars fitted with governors which confine the speed to the lower fixers.

During the next year 42 companies will be organized, and to complete the equipment for these, 200 more men must be educated. In speaking of the methods utilized the instructor, Capt. J. J. Henry, says the men are educated on eagine construction, transmission, either and differential, cooling methods and lubrication. Ten days are allowed for preliminary work and at the end of that time, if proficient, the student is instructed in the control brakes and clutch levers and the use of fuel and lubricatios.

Passing these texts the members are assigned to the duty of disassembling a motor and transmission. Ignition and carburetion is then taken up and lectures given upon these subjects. At the end of 20 days the class is given instruction in road work and exhaustive texts must be complied with, such as operating in crowded traffic and at different speeds.

The motor equipment at present consists of 10 hose warons, one front-drive propelled ateam engine, one Comple-Gear water tower and four hook and ladder wagons of similar design. Commissioner Johnson advertised recently for bids to supply the department with 26 combination chemical and hose wagons of the flying squadron type, three wagons of the high pressure type and three machines without chemical attachment. The total cost will be in the neighborhood of \$7.00,000.

As a result of visits to the commercial car shows at New York City and Boston, Portsmouth, N. H., Is to have a Pope-Hartford chemical wagon, made by the Pope Manufacturing Company, Hartford, Conn. The mayor of Portsmouth and child engineer placed the order at the Boston show and delivery will be made June 15. The machine will cost \$5000 and will be fully equipped.

Many towns and small cities make it a practise to establish a central station in which is installed apparatus capable of affording protection to the entire community. While the equipment is limited it must be of high efficiency

dual in rear, and drive is by chain, fully enclosed. The construction of the chassis is in keeping with the high grade established by the Knox Automobile Company and the design should find favor with municipalities contemplating the installation of automobile fire apparatus.

lpswich, Mass., depends upon a volunteer fire department for protection, and the members of this company are to be commended for their progressiveness. For several years the company has desired an automobile, but the town fathers could not see their way clear to appropriate the money. The company was undaunted, however, and began a series of entertainments for the purpose of raising money enough to purchase a piece of motor propelled apparatus. The townspeople warmly supported the efforts of the firemen and after raising a little more than half of the sum required, enlisted the aid of the town officials who contributed the difference. An order was placed with L. B. limiter of the Butler Motor Truck Company of Boston, now with the General Motors Truck Company, Detroit. The machine, which was delivered re-ently, is a combination hose and chemical wagon, having a 25-gallon tank and 500 feet of hose. In addition it carries ladders and the usual equipment. It is lighted by electricity. A feature of the



New Knox Combination Apparatus, Made by the Knox Automobile Company, Springfield, Mass., Which is a Fire Department in finelf, Exhibited at the Boston Show Recently.

and capable of covering considerable ground rapidly. Many of these municipalities cannot afford to purchase several pieces of automobile apparatus and to meet these requirements the Knox Automobile Company, Springfield, Mass., is producing a vehicle which in itself be a complete department, combining as it does the hose cart, hook and ladder truck, chemical and pumping engines.

In the accompanying illustration is presented the machine which was shown at the losion show recently where chief with was shown at the losion of the recently where it attracted considerable favorable attention among visiting officials of them soot of the motor propelled apparatus. The car is propelled by a powerful six-ylinder motor which operates a pumping capable of pumping seeveral hundred gallons of water a minuter. The machine is equipped with a chemical tank, the bose for which is carried in a case, making for accessibility. Hand chemical tanks are fitted, also a number of ladders; in fact, all modern fire fighting devices are included.

The body provides ample seating capacity and throughout the material is the best and the workmanship of the highest quality. Solid tires are fitted, single in front, and truck is the fitting of the original Bonney-Cot bell, taken from a hand cart in Boston, which was cast in 1852, taken to lpswich and kept as a relic by one of the residents who presented it to the fire company.

The fire department officials of Boston were given an opportunity to note the practicability of the motor propelled vehicle recently when a ladder truck was driven from Longwood and Brookline avenues, Roxbury, to the top of Parker Hill In less than three minutes. The machine was a product of the American-La France Fire Engine Company of Elmira, N. Y., and was handled by a representative of that concern who was unfamiliar with the route. The truck will be in service at Forest Hills for one month during which time it will answer slarms and its work will be watched by the department officials If it proves saiisfactory, steps will be taken to secure its purchase. machine carries a complete equipment of ladders, two 40gailon chemical tanks and 200 feet of hose, in addition to the usual fire fighting apparatus. It is propelled by a fourcylinder, four-cycle water-cooled motor and is equipped with a hydraulic transmission affording any number of speeds

SOLVING CONTRACTOR'S DUMPING PROBLEMS.

Lynch Special Bodies Provide Means for Handling All Classes of Material in Simple and Effective Manner with Substantial Saving in Time and Labor.

BECAUSE of the superiority of the mechanical transport of which over horse drawn equipment in the matter of quick baulage, as well as in economy of operation, it makes a decided appeal to building and excavating contractors, as time is money in every sense of the word in these lines. But, as with numerous other industries, some means must be devised for rapid handling of materials if the motor truck is to give its maximum of efficiency.

In order to consider this matter more fully, let it be assumed that contract calls for creating a substantial railroad bed across a large swamp. Under these circumstances, it usuaily will be necessary to secure the material at some body or box, which this concern has utilized with splendid success. This body is now made in a wide variety of types for all classes of work, and marketed by the Lynch Manufacturing Company, South Chicago, Ill.

Accompanying illustrations present the Lynch body in three different designs, aithough the photographs are of models instead of full sized truck bodies. The standard bot is made to fit any five-ton truck chassis, being 4.5 feet wide, 12 feet long and any height desired. The chassis lucel is fitted with a standard platform body, supplemented by a frame of eight-inch channel iron, which holds the dumping body securely in place. Fig. 3 ullustrates this

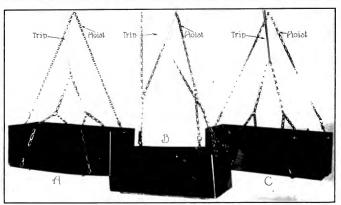


Fig. 1-Three Types of Lynch Bodies as They Would Appear Lifted Clear of Their Chassis, Preparatory to Dumping,

little distance from the swamp. To be sure, the railroad might be utilized in conveying loaded cars from the excavating point to the place of dumping, but those who are most familiar with operations of this nature, will agree that the contractor is forced to secure his material wherever possible, and teams are much more frequently called upon to do the hauling.

The motor truck offers an ideal solution of the difficulty, but there are other considerations than the mere hauling of the material. For instance, it manifestly would be impossible to run any loaded wazon, no matter what the type, over the swamp itself. Material might be drawn to the extreme limit of the graded portion of the right of way and dumped, but this would mean a large force of men at this end of the work, as well as at the seree of excavation.

Realizing the importance of time in this respect, Charles Lynch of the Lynch, Brandenberger Company, Chicago, ill., a firm engaged in excavating and general teaming with sand, gravel, etc., recently devised a portable dumping construction somewhat more clearly. Returning to the matter of filling in the swamp above mentioned: By using one derrick at the excavation point and another at the swamp, the equipment is completed with a standard five ton truck and several of the Lyach bodies. The latter are lowered into the excavating hole, where they are filled either by hand or steam shovel, then lifted by derrick onto the truck chassis. Arriving at the dumping place, the other derrick is called upon to hoist the loaded box from the chassis, awing it over the swamp and dump it wherever desired. The truck is delayed at either end of the route, only long enough for the derrick to lift the empty box off the chassis and rejaine it with a filled box, or to take the loaded box, dump and return it to the chassis, a matter of less than five minutes.

The three types of bodies illustrated at Figs. 1 and 2 permit at least three different methods of dumping. For the swamp job, possibly that at C would prove most effective. This dumps through the bottom. The two halves are

pivotally mounted at either end, so as to awing outward when the trip is sprung. It will be noted that the holsting chains extend from the top of either end, and as the derrick picks up the loaded box, the weight of the material within acts to hold the two sides firmly together.

When it is desired to damp the entire contents at one time, the chains operating the trip are fastened at suitable points at the bottom of each aide. As the loaded box is awang into position, a pull upward on these chains, which are brought together over the top for this purpose, causes the sides to spring outward and every bit of material withing dummed Instantiv.

This aams type of box may be utilized for hauling brick, in which case it is not only possible to dump the entire load at a given point, but one-half of the load may be dumped in one place and the remainder in another. In this instance, the trip chains on the side in which it is desired to retain the load are unfastened from the clips at the bottom of that side and hooked in similar slips at the top. Pulling the trip then pulls the opposite side upward,

to pull the rear end of the box upward as the load travels toward the opening in front.

It readily will be seen that any of these bodies could be utilized with success in excavating and dumping work, while each has a special appeal in other lines of activity. With each, be entire operation of the dumping features is in the vontrol of the engineer in charge of the derrick, and he has full control of the working parts at all lives.

Boxes A and B also are adaptable for dumping by the moutive power of the truck. In order to make such use of them, however, it is necessary to utilize a special construction, in which four Jack seriess play a prominent part. These Jacks are placed, one each at the four corners of the frame, and are fastened to the chassis. Suitable clurches are installed to connect the jarks with the truck engine.

With box B, for instance, the operator throws in the distributions of the two front Jacks and the front of the body is forced upward until the load travels out the rear, the end gate, if such it may be termed, having been raised meantime. With box A, the load may be dumped from either

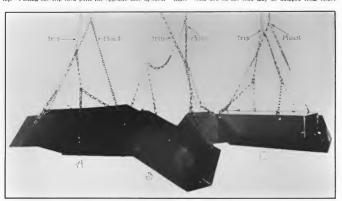


Fig. 2.—The Three Types of Lynch Bodies to Dumping Position: A, Lond Emptied from the Side: R, End Dumper; C, Lond Released Theorem Restor.

while the bricks it is desired to retain are jeft in the box to be dumped later by a reversal in the manner of hooking the chains

The box at A also might be used on the awamp Job, but this designed to be dumped at the side instead of at the bottom, and it may be dumped at either side. The construction is very similar to that shown at C, with the exception that the bottom and ends are solidly retained in position while the sides swing outward, according to which side it is desired to operate in dumpling.

The third box is an end dumper. One end is pivotally mounted at a certain distance on the allow, and the hoise-ing chains are fastered at the top at four points equi-distant from the centre. The trip is attacked to the top of the end at which it is desired to dump the load, while the other end as which it is desired to dump the load, while the other waven into position for dumping, then as it he rear. When the same manner as the others, but the holisting chain eads to the same manner as the others, but the holisting chain tends

side in a similar manner, by utilizing the clutches for the jacks on the opposite side.

Inamuch as all bodies are made in the same standard size, they are absolutely interchanceable. Thus it is possible to utilize the type best adapted for hauling brick today, and change to stone or asphali tomorrow, and dirt the next day. In fact, there appears to be no limit to the possibilities afforded by the massession of a set of these boxes, although, as it is has been pointed out, it is not absotitely necessary to have different hodies in order to handle varying loads with success.

While numerous types of dumping hodies have been designed for the hauling of road by mechanical transport, it is pointed out that the Lynch body has a special advantage in that the truck mixth be employed profitably in other work when not needed for the delivery of the main product in addition, the interchangeability of the bodies is expected to have an appeal for those who desire to solve the product.

lem of loading the truck without delay at the receiving end of the line

Although it was such work as that of exeavailing and dumping, which originally developed the device, it has found ready acceptance in numerous other fleids. It is unnecessary to cite a list of its many possibilities, but it will prove of interest to note how effectively it might be used in building construction, particularly with the so-called sky scrapers of the larger citles. A material saving in time and labor might be brought shout by holstling a loaded body of this type to any floor of the partially completed structure, and there dumping its load of hrick, etc., without extra bandling.

The Lynch Manufacturing Company has studied this system from every angle and is prepared to go over the situation with any truck owner or manufacturer who feels as it does, that the Lynch portable dumping body offers a

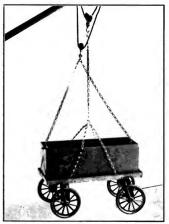


Fig. 3—1, set Pertable Damping Body in Place on Truck Chassin, Ready to Be Lifted by Derrick, antifactory solution to many of the problems of motor transportation. The scheme is by no means confined to trucks of five tons capacity, and it would be possible to secure bodies equally adaptable to smaller vehicles.

OPERATING COSTS OF ENGLISH TRUCKS.

During the recent visit of the American automobile engineers to Europe the party discussed commercial vehicles with a prominent British truck expert, who has made a study of trucking costs as they exist in England. The authority had gathered statistics from a number of installations, and after comparing them arrived at a very fair estimate of the average cost of service in that country and gave the figures to one of the members of the party.

In comparing these costs with those in this country allowance should be made for the differences in environment, notably that of wages, as those paid to English drivers are about one-half of what they are in this country. The figures presented in the accompanying table will prove of interest:

	1120	2240	2	3	5	
Size of Vehicle-	A kees.	Ibs.	tons.	tons.	tons	
First cost	1536	\$1762	\$1936	\$2856	\$3336	
Weekly mileage	400	400	390	224	300	
	Operating costs a mile					
	Cents	Cents	Cents	Cents	Cents	
Driver's wages	1.68	1.68	2.00	2.18	3.20	
Fuel (petroleum spirit)	1.10	1.54	1.90	2.50	3.34	
Oils and grease	.24	.24	.25	.32	-46	
Rubber tires	1.00	1 50	2.30	3.00	5.20	
Repairs (materials and wages)	1.10	1.70	2.06	2.24	2 00	
Rent, rates and lighting	.24	.30	5-0	.80	1.00	
Insurance and claims.		.48	.70	. 54	1.30	
Depreciation		1.168	1.424	1.90	2.22	

Vans→	tearly	Totals. Lorries—	
1120 lbs	\$1449.60	2 tons	\$2366.40
2240 lbs.	1×76 ×0	3 lons	2664.00
		5 tons	

CARE OF TIRES MEANS MILEAGE.

Overloading and overspeeding are conceded to be the greatest evils of the commercial vehicle as not only is the mechanism of the machine subject to attessee, but the life of the tires is shortested. D. C. Swander, manager of the New York branch of the Firestone Tire & Rubber Company, Akron, O., asys there are a few simple rules which the owner of every truck will do well to instill in the minds of his drivers.

"Rubber has just so much life and no more, and if overworked cannot recuperate," explains Mr. Swander. "When the machine is overloaded or oversgeeded the rabber auffers. Another thing that shortens the life of a tire is brakes that are out of true. If one be tighter than the lot ofter, one tire is subject to all the strain. Wheels should be trued up, and oil or grease should not be allowed to starr and stop gradually, not suddenly, and always to a straight line. By turning the from theels before starting an unnecessary strain is placed upon the tires and their fastenings. Car tracks are also detrimental to tires. They grind away their edges. If these suggestions are followed the tire expense will be reduced considerably."

WHITE 'BUSES GIVEN SEVERE TEST.

The efficiency of motor propelled passenger combinues was demonstrated in Chiengo during a severe bilizard in that city recently. The 55-mile gaie accompanied by a heavy fail of snow tied up the atreet car and elevated lines and even the Illinois Central suburhan service was inoperative. In spite of the conditions the fleet of 12 White busses, manufactured by the White Company, Cleveland, O., were constantly in service between the Northwestern depot, Marshall Field's and Mandel's. The machines ran on scheduled time during the entire storm

PROPOSE THREE-DAY RUN.

A three-day truck run is being agitated by the dealer in Boston. It is proposed to make the event more of a demonstration of the practicability of the mechanical transport by having the machines go by easy stages from Boston to Providence and thence to Worcester and back to the starting point. A stay in each city is contemplated for the purpose of affording the business men an opportunity to lineasect, the vehicles.

CORRESPONDENCE ON PERTINENT SUBJECTS.

Mr. Thomas Takes Occasion to Explain His Position More Fully with Respect to Anti-Friction Bearings for Worm Gear Mounting.

CONCERNING the subject of anti-friction bearings for worm gear mounting, a discussion of which has been going on in these columns for some issues, H. Kerr Thomas of the Pierce-Arrow Motor Car Company, Buffaio, N. Y., took occasion to criticise some of the statements made by Victor W. Page of the New Departure Manufacturing Company, Bristoi, Conn. in the March number Mr. Page answered Mr. Thomas at some length, in the following communication Mr. Thomas explains his position more fully:

Patter MOTOR TRUCK

Gie:

I have been interested in reading Victor W. Dage's had better attent by your March beaut, and would like to point out had thing no experience on the matter. I have never questioned the suitability of New Departure bearings for use in worm gearing. My object in entering the discussion at all was to cantin Mr Page and others of your readers against was to caution Mr. Page and others of your readers against the light loads explicitly specified as existing in worm gaza-in Mr. Page's first article. Engineering generalizations are invariably daugerous. Calculations applicable to one auto-mobile would not necessarily be used for smotter.

The reason why the particular truck in which I am intersuch high loads on its bearings is ewing to the fact that the entire load is mactically confloed to the rear axie

fur sufficiently good reasons. It would have been easy to distribute it had I thought this advisable

Mr. Page, however, raises in the course of his last letter,
such numbers of points that the entire design of an automobite is involved, such as required horsepower, worm efficiency for different angles, worm tooth pressures, vehicle speeds, transmission efficiency, traction efforts, motor torue, and other

matters. I will only refer to two of these.

Mr. Page, in the example he gives, states that the torque at

Mr. Page, in the example he gives, states that the torque at the centre of the worm shaft is 256 inch-pounds. As I under-stand "torque," there can be no such thing as torque at a cen-tre. If the torque is nesawred at the centre, the "linch" factor has here reduced to limit 0, hence the "pounds" factor must be rated to the limit of infinity, and I do not thick Mr. Page means this

Next, Mr. l'age refers to the worm efficiency of an per cent, and suestions Mr. Younger's claim for 95 per cent. The loss in driving through worm gears is not greater but very much less than five per cent, as a manufacturer of worm gears of the highest repute in this country can demonstrate to Mr. Page if

likhest repute in time seems, the white is the white with it with the white is the white in the point as I have dealt with it fully in the pages of one of your contemporaries, and while fregret I must still differ with Mr. Page in many of his devictions, I must thank him for his appreciation of the friends within of my citicomes. This were never unread in any other contemporaries and the properties of the

Yours truly. H. KERR THOMAS, A. M. I. Mech. E., M. S. A. E. Buffalo, N. Y., March 19

MUNICIPALITIES IMPROVING TRAFFIC CONDITIONS.

THERE is little question that traffic conditions have a very material bearing on the successful introduction and use of the commercial vehicle, and it is interesting to note that several municipalities, realizing the importance of the newer method of transportation, have taken up the matter in a systematic manner. A. W. Robinson of the Locomobile Company of America, Bridgeport, Conn., has given this subject considerable study and the result of his findings are embodied in the following communication:

Editor, MOTOR TRUCK.

Traffic conditions in congested portions of dur large cities have been so greatly improved by the motor track that it is not a wonder that so much co-operation has been obtained from the municipal authorities and from the heads of the various railroad and shipping companies Today the owner of the motor truck finds conditions varily improved over those of three years ago, but there is still room for improvements and for added facilities whereby the efficiency of the motor truck can be so increased as to result in a still further saving for the owner. for the municipality, and for the transportation companles

The efficiency of a motor truck varies directly with the The efficiency of a motor track varies directly with the motor conditions of the condition of the condition

which under normal it from making the unimer of continuous which under normal circumstances it should.

From the awner's viewpoliti it is not reasonable to expect him to incur a large expense and make a heavy investment for him to ficur a large expense and make a heavy Investment for motor trucks, each of which would supplied infere two-lowest motor trucks, each of which would supplied inference the municipal and transportation officials resilistic the immens-advantage of the motor truck, and knowing that the motor truck is saving them large amounts of money through his re-liable many of the delays which in the pest proceds so alarming Municipal sushorities find that motor traffic has, from their viewpoint, there great advantages over here traffic. Thus

viewpoint, three great advantages over horse traffic. They find that the motor truck is less destructive on the street, reducing the maintenance charges of the street repair department; they know that the reduction of the amount of horse debris, due to the supplanting of the horse by the motor truck, not only effects a large financial saving but it also has resultent on the first starse financial saving but it also has resultent. ed in a betterment of the public health, due to the more sani-tary condition of the streets. They also appreciate the fact that the motor truck has decreased, for any given lonnage, the number of vehicles required, with a consequent relieving of traffic congestion at rush hours

This last is a very important factor in municipal conditions today and can be better registed when it is known that the normal large capacity truck, which under ordinary curumstances will supplant three two-horse teams, not only occupies a space equivalent to about 30 per cent, of the actual leasth of three such teams and wagons but also, owing to its great leasthilly and ease of control, it can follow closer to the vehi-cle immediately preceding it. As an actual fact, ossentiar that the traffic conditions in any given street are as congested as the trains conditions in any given street are as condessed as they are today, semi-liting over four times as much tenouses could be carried by a given point in a given time if all the traffic were carried on motor vehicles, it assumed that only the same tunnage was to be transported traffic conditions would be greatly relieved and congestion would be practically

Municipal authorities are doing all they can to further this end by keeping the streets in better repair, and by giving the faster moving motor vehicles the preference wherever possi-ble, it is probable that in the near future, the municipalities sia. It is probable that in two near future, the momeranties will co-operate further by opening many streets which are now dozed to heavy traffic, and thus enable the truck to save time by eliminating detours which formerly were necessary.

Hime by eliminating detours which formerly were necessary immeries improvements have also taken place in the hast re-years at the railroad depots and at the witarrs. Where for-ting the state of the in the broadest sense of the word, realize better than anyone else the need of speed, and they welcome any innovation which tends to relieve any congestion on their own platform, and which diminishes the time in transporting goods from the facwhich diminishes the time in transporting goods from the fac-tory to the selectes of the distributor. While the lides of re-serving a platform for motor trucks only is a comparatively new innovation, railroad after railroad is adopting the blea as fast as conditions and expediency will permit, and the per-centage of space so reserved to increasing far more rapidly than any one not thoroughly conversant with the situations would Impulne

The same conditions obtain at the wharves, steamship traffic men, owing to the greater intervals clausing between their shipment, are far more troubled by freight congestion than are the railroad traffic men, and they appreciate the relief from congestion afforded by the motor trucks. The motor truck has been valuable to steamship men in another way. If a wharf can be quickly cleared and s new cargo as quickly put on the wharf, sailings can be more frequent without increased wharfage facilities, a very serious problem when the comparatively small number of good whatves and of really good ports is con-sidered. Steambilty men in their endeavor to take advantage sidered. Steamship men in their embeavor to take advantage of benefits accruing from the motor truck have done a great Only a few years ago, before the steamblin men took an entire interest in motor trucks, foolish fire regulations, since repealed, made it impossible to run a motor truck on a wharf in any of the large cities to this country, and it is only recentionally the state of the control of the contr

The extent to which co-operation has been carried out might be conlined indefinitely, but let like sufficient to say that in-becoming in the continued indefinitely and the like sufficient to any that is not of the motor truck, not only by the mike extend and included the motor truck, not only by the mike off the motor truck, not only by the mike off interested in the great problem of transportation directly interested in the great problem of transportation only effects a saving for the truck user, the railroad man, or only effects a saving for the truck user, the railroad man, or

the shipping man, but also to of vital importance to the public at large. The public interest lies in the fact that minimizing of delay means a lower transportation cost. Every cent saved in transportation between the producer and the user eventually presults in a lower price for the user. While in the individual case tills saving is not large, in the sacreact, an immesse amount of morey will be saved when traffic conditions are and towns, are transported on motor trucks.

Yours very truly,

A. W. ROBINSON.

Truck Sales Manager, Locomobile Company of America Bridgeport, Conn., March 13,

GOODYEAR TIRE LINE FOR 1912.

Tire manufacturens are keedly alive to the certainty of tremendous growth in he motor truck industry which is expected to equal that of the pleasure vehicle within the next few years. The Goodyear Tire & Rubber Company, Akron, O., has made preparations for its share of the business and has adopted for its slogan, "A Tire for Every Service." In the accompanying illustration is shown the Goodyear line for 1912 and these are, reading from the left to the right, the individual block, Goodyear-Most caushino, Goodyear demonstable, Goodyear netal base, Goodyear Most Ser department and diagonal block that

Regarding the individual type, great stress is laid on

sented by the most engaging safesmen. Those who happened to select a proper capacity vehicle found in most cases, that intend of being more expensive than horse delivery, as they rather expected, motor haulage really saved them a great deal of money, providing good men, who kave how to operate the vehicles and care for them properly, were secured. Those who purchased trucks not suited to the service, or who permitted them to be operated by poorty trained drivers, returned to the horse, or after much expensive pioneering found a suitable truck that would do thely work economically.

"While the advertising value of commercial power vehicles has not entirely disappeared, it is a factor that is not longer regarded as greatly important by truck buyers. The



Goodyear Truck Tires for 1912: Reading from Left to Right, Individual Block, Goodyear-Mota Cushion, Goodyear Demountable, Goodyear Metal Base, Goodyear-Mota Fire Department, Diagonal Block,

the fact that one of the blocks may be removed and replaced without disturbing the other members. Each block has its own fastening plate and this device is extremely simple.

The demountable track tire is furnished in the single as well as dual type and the Goodyear company emphasizes the claim that this style will be universally used shortly. The Goodyear demountable is recommended by its maker as simple of operation, guaranteed for 10,000 miles and adaptable to the S. A. E. standard wheel. The metal hase tire is of the permanently attached type and finds favor with many truck owners.

CONDITIONS GOVERNING TRUCK USE.

That the last two or three years have seen a marked change in the manner in which business men approach the purchase of trucks, is the online of C. P. Cary of the Perless Motor Car Company, Cleveland, O., who has given much thought and study to this phase of the selling situation. He finds that the early vehicles were bought largely because the purchasers thought it would give them a reputation for progressiveness and would prove a good advertising especialtime. He says.

"Naturally, they knew nothing about trucks. A truck was a truck and they usually took the one that was repre-

truck when well made and given enough work to pay its way, performs an extremely valuable service. And as service over a considerable period of years depends upon construction, most buyers go rather carefully into the mechanical features of every vehicle that comes under their consideration."

I, M. WARD SUCCEEDS P. P. WILLIS.

J. M. Ward of the Waverley Company, Indianapolls, Ind., has been appointed to succeed P. P. Willia as serviced ry of the Indiana Automobile Manufacturers' Association. The appointment was announced recently by Frank E. Smith, general manager of the Maxwell-Briscoe plant at Newcastle, Ind. Mr. Willin resigned previous to the New York show and President Smith reserved naming a new off-ficial until recently. Mr. Ward is well known to the automobile industry.

MOTOR CAR EXPENDITURES.

According to a report filed by the police board of Hartford, Conn., the automobile expenditures from April I. 1911, to Feb. 29, 1912, were as follows: Two patrols, \$135.5.39; ambulance, \$528,66.



The Enterprise Trucking Company, New Havan, Conn., has been incorporated for \$10,000.

The National Motor Transportation Company, Washington, D. C., has been incorporated for \$1,000,000 to do a general transfer and passenger business.

J. K. McKeeagh, well known in the automobile industry, has accepted a position with the Chicago branch of the Velie Motor Vehicle Company of Moline, III.

The Stewart A Clark Manafacturing Company, Chicago, maker of Stewart speedometers, has leased a store and basement at 174 Columbus avenue, Boston,

The Motor Truck & Anto Company, Portland, Mc., has been incorporated for \$10,000. Lewis A. Goudy is nomed as president and George W. Merow as treasurer.

Bishop & Whitney, operating a garage at Canaseraga, N. Y., has taken over the garage and taxleab business of Roberts & Non. Baldwin street, Elmira, N. Y.

James A. Williams, Boston, New England agent for the Cartercar Company, Pontiac, Mich., has leased the store and basement at 288-1906 Hoyiston street, Boston.

The Knickerbocker Motor Trark Macafactaring Company, New York City, is completing a new concrete factory building on East 150th street, tear the Harlien rives

ing on East 150th street, near the Harlem river.

The M. M. Automobile Automotic Safety Signal Company,
Why York City, has been capitalized at \$50,000. The incorporators include J. C. Mcite, W. P. Rawlins and L. M. Black.

The Whitmore Auto-Gene Composition Sales Company, Jersey Pity, N. J., has been incorporated for \$100,000. The incorporators include R. S. Maniz, J. R. Turner and L. H. Gunther.

The Victor Haggs & Top Company, St. Louis, Mo., has been incorporated for \$2000 to deal in carriage and motor car tops. The incorporators include Oliver E. Carter, Roscoe Perdue and Frank Roband.

The Efficiency Supply Company of Boston has been organized with a capital stock of \$5000. The officers are as follows President, William II. Murphy; treasurer, Francis J. Coughlin, and M. F. Curran.

The N. S. W. Motars Company of Indianapolis, Ind., has been incorporated for \$60,000 to manufacture automobile parts. The directors include Charles Neson, Louis Sagalowsky and F. W. Wellman.

The Standard Tire 4 Automobile Company, Plainfield, N. J. has been capitalized at \$25,000 to manufacture motor vehicle tires. The incorporators are as follows: II, P. Visaelier, J. J. Sievin and F. Ivamy.

The Standard Tire & Robber Company, Springfield, Mass, was incorporated recently for \$10,000. The officials are as follows. President, William Cronin; treasurer, Wayne E. Hughes, and James S. Waddell.

The Los Angeles Antomobile & Taxienh Livery, Los Angeles, Cal. has been incorporated for \$15,000. The incorporators include Belle F. Lewis, Harty E. Jones, Evelyn Jones, Charles M. Lewis and William B. Lewis

The Available Track Company, Chicago, has been incorporated for \$25,990 and will manufacture motor vehicles and parts thereof. The incorporators named are. E. F. King, A. H. Wiedhofft and R. C. Hume.

"Graphite," which publication is devoted to the interests of the Joseph Pixon trueline formpany, Jersey City, N. J. contains in the current issue, some interesting applications of graphite to the motor car.

The Corbin Motor Vehicle Company, New Britain, Conn., has completed a new ambulance for the city of Waterbury, Conn. It is equipped with modern conveniences and is propelled by a 40 horsepower motor.

The Essen Rapid Transportetton tempony, Hoston, Mass., than been incorporated for \$50,000 and will engage in a general

trucking business. The incorporators include George E. Love-

The Howe Motor Company, Coateaville, Penn, will be reorganized in the near future under the name of the Rowe Motor Manufacturing Company, and will produce commercial vahicles in larger numbers than harctofore.

The Chase Motor Trock Company, Syracuse, N. Y., has completed a three-story addition to its plant, 80 by 140 feet. It will be utilized for the assembly of commercial cars.

The Baker Motor Vehicle Company, Cleveland, O., announces that it has secured the services of William P. Kennedy, the well known consulting electrical engineer of New York City to act as superintendent of the bureau of service efficiency.

The Copithorn Demonstable Rim Company, Natick, Mass., has been incorporated for \$100,000 to manufacture and self-tires and demountable rims. The incorporatros and directors include President Harry M. Ferguson and Louis C. Smith.

The Connecticut Telephone & Electric Company, Mariden, Conn., maker of Connecticut ignition apecialties, announces the opening of an office, stock and show room at 221 West 5tth arrest, New York City, where a full line of parts, etc., will be carried

The Gramm Motor Trock Company, Lima, O., has an interesting and well illustrated special story upon the adaptability



New Home of the New England Branch of the Kinnel Motor t'ar Company of Hartford, Win, Which in Expected to Be Fluished by Ang. i.

of commercial vehicles to the furniture industry, in the February issue of "The Gramm," a publication issued by the Lima

The Cleveland Taxicak Company, Cleveland, D. maintains a large flet of these vibilets and in the accompanying illustration is depicted some of the automobiles in service. The cars are tha product of the White Company, Cleveland, O. which makes a specialty of mechanical transports both for passenger and freight service.

The Morse-Headto Compsos, Springfield, Mass. has acquired a tract of land between Chestinui and Dwight streets and will erect a six-story building which will be of fire proof design. The concern handles the G. M. C. line of commercial vehicles, as well as bleasure cuit.

Amos J. Shorey, northern Maine representative of the Velicine, has appointed Frank Mitchell sub-agent. The latter will establish a service station, J. T. 'turtius & 2.0. Velic agent for Simabury, Conn., has closed with Tucker & Palmer of Tarinville, Conn., as a sub-agent in that place.

The Lipperd-Stewart Motor for Company, Buffalo, N.Y., announces the appointment of the following new agencies. Nosily & Ensor, Battimore, Md., Edward W. Jenniogs Company, Bridgaport, Conn., Michigan Motor Company, Portland, Ora., Whitten Motor Vehicle Tempany, Providence, R.

The Lanth-Juergens Mater Car Lempany, Fremont, O. has decided to add to its capital stock and to utilize the proceeds in increasing the output by execute large additions. A branch factory will be constructed at dibsonburg, where the residents have subscribed for \$50.00 worth of stock.

The Amalesmated Matters Unrustration, Low Augeles, Cal., has been incorporated for \$1.000,000. This directors include W. M. Varney, C. B. Croner, Robert Meixer, Ermest Kouwen, Howen, B. P., Cralag, C. L. Woodbury, B. F. Luxia, L. Scheer, C. F. Schroeder, J. A. Craik, T. W. Heddo, J. L. Kirkham, Thomas Carmody, Jr., J. B. Pirice and N. E. Masson.

James Drammond of Newburyouth, Mass, has become third with the Trummond Motor Far 'tomaginy' of Condab, Newburke engers will move into its new boutding at 224 South 18th street, about May 1. The company is accust for the Sa, it trucks, and the officials are: President W. It trummond, tree L. W. Schieble, secretary, W. B. Bughes.

Fred J. Thus, who for the past year has been connected with the tetald department of the American Locumutive Company of New York City and Providence, It I., is now associated with the wholesale department. He is well known by the automobile trade having left the heyele industry for that of motor care when the latter was in its Infance.

The Hemy Electric Company, Anderson, C., amounces that arrangements have been made whereby Child, Lov & Charchill, Inc., Spokane, Wash. the Washington Auto Supply, Seattle, and the Archet & Wlighto Company, bordrand, Gre, will act as Remy service stations in their respective cities. Each will

President, Allen M. Hartzell; vice president, Sherman H. Grubb; secretary-treasurer, Samuel J. Stocks. The directors are violized Buhr. Allen J. Fond, Herman Messman, William F. Keller and Jonah Adams.

The P. H. P. Noter Treek company of Westfield, Mass. has been accupred is W. S. Maguli, thuy toberne and 1. P. Miller all of New York, and will be repracticed as the Westfield Motor Treek Company with a capitalisation of 113-200, of which 125 in Westfield and plane to intil 200 machines this year. The organic track was designed by 1r. A. B. Petraleton and its manufacture has been carried on for every a year. The visual track was designed by 1r. A. B. Petraleton and its manufacture has been carried on for where a year. The Visuale tracks of New York and Visuale Child Haste charge of the safes in New York and Visuale Child.

1. F. spittoer, New York City, maker of againsts, special ties, has resent an interesting incubing contaming a cosmoof the performance of ears outpiped with Spittoer in recompetition in read-full and task, which gravides a needcompetition in read-full and task, which gravides as dealsession in particular. The records are exhaustive and autisents and with summon illustrations being out the Spittodrick and the spittodrick and the spittodrick and the spittodrick and knowled may be obtained by apolytics in C. F. Spittoder, I was street and Walton arctical, New York City.

The Schildwichter Curriage Company, Park assemble and ISMs street, New York City, buschaken over the exclusive easiern agency for the Sternberg tracks, made by the Sternberg Manufacturing Company, Milwankee Wis, which corects



Fleet of While Taxicaba, Made by the White l'ampany, Cleveland, D., In Service with the Cleveland Taxicab Company of That City.

carry a full complement of the Remy ignition products as well as retain a corps of skilled experts.

The Furker Transmission Appliance Company, Springfield, Mars, which is capitalized for \$1,000,000 to manufacture a device to eliminale the friction between goars, expects to orapy new quarters on the top floor of the tituneers Arms factor of Clark Durker of Springfield, and the transmission and clutch are of the constant uncel type.

The Horst & Strieter Company, Inverport, Inc., annuances to a piece of a new graries at 1417 Second avenue, where such a strentform will be gold to the care and maintenance of by the General Monte Track Company, betrett, and maintains a service stail on for these vehicles. Henry W. Horst le president, and M. E. Strieter, secretary and tracturers, tice president, and M. E. Strieter, secretary and tracture.

W. R. Berrak, predicting the New Hampolite Auto Company Toncord, N. H. Jass closed with Hobert Knyare of the Velic Boston Branch for the Velic agency in Cancord and chally. A service studion has been entablished Walter Velic Johnson, Essex Junetion, VI., will represent the Velic comservice studion at Burlington and Essex Junetion.

The Wayne-Haire, Water Ire (ungan), New lines, Inc., and was organized recently with a paid un papilal stock of \$2.500. It was decided to move the machinery of the Woodburn Auto Company to New Haven and install the apparalus in a new factory building which will permit of a larger production of trucks. At the meeting the following nifleers were elected.

makes two, three, four and five-ton power wagous. In addition to the Sternberg the Schildwachter Carriage Company is agent for the Melnyte line.

The Male Motor Truck Company, Indianapolite Ind. announces the reaganation of T. It Wallerich, seemed same reasons or. It is the Malerich, the ment same reasons or. It is stated to the makers of Marton, Itayree and tiverland ears. It is stated into the has accepted a position as manager of the automobile department of the newly organized tiences Industrial & Manufacturion Company. The latter was incorporated receipt in the company of the latter was incorporated receipt in the company of the latter was incorporated receipt in the latter was incorporated and latter with the latter was incorporated by the latter was incorporated by the latter was a latter was a latter with the latter was a latter with the latter was a latter was incorporated was a latter was a latt

The Niseri Maior Lee Campany, Hartford, Wile, Is exciting a new home for 1th New Jingland branch at Commonwable acrows and Pleasant street, Buston, of which Ji. B. Proiden B manager. The new structure will be 74 by 200 force and will be a manager. The new street of the product of this concern. The plans call for an exceptionally fine satersoms, which will have a frontase of 3 feet and a depth of 70. The garage will occupy the rear of bircelly off this will be a room for the chandrater. The series shop will be located on the second floor where upsto-date machinery will be operated by electricity. A frature will be fitting of a trolley system for handling of heavy parts. The recommendation of the production of the chandrater will be fitting of a trolley system for handling of heavy parts. The recommendation of the building is expected to be ready for occupancy about Aux. I, and in the accompanying illustration is depicted the architects of drawing of the structure.

TRUCK REGISTRATION IN MASSACHUSETTS.

IN RESPONSE to a special message from Governor Foss of Massachasetts, the sub-committee of the legislative committee on highways and bridges has formulated a bill, in which the few for registration in that commonwealth are to be increased materials. The proposed logislation contemplates the following: From five to 1th horsepower, 30 cents a horsepower; 10 cents (a) colored to 39, 30 cents, Sub-casta a horsepower; 10 cents (a) cents (b) and (b) and (c) and (c

"in regard to commercial vehicles. We are informed that the same rate is to apply to these. This is manifestly unfair. After a great deal of consultation with different nanaffacturers of motor frucks we do no believe that horse-power is a fair scale to work on in regard to commercial vehicles. The proposition is a different one from that or pleasure vehicles. Some fixe-don trucks, for example, have 35 horsepower, some line 40 and some 48.6. Each carries

not be able to sell the truck, and the tax would not be so large that there would be any object in so doing,"

FEDERAL TRUCK HAULS FIRST LOAD.

Work has been commenced upon the site for the International Pannan-Pacific Exposition which will be held a San Francisco, Cal., in 1915. The first load of lumber to be delivered to the ground was furnished by the San Francisco Lumber Company which utilized a Federal truck, made by the Federal Motor Track Company, Derrott. In the accompanying illustration is depicted the machine about to start on its trip to the exposition grounds.

The cur is projected by a four-cylinder, four-cycle, water-cooled motor of the L head type having a 4.24-inch bore and 4.24-inch stroke and is rated at 30 horse-power. ignition is by an Eisemann high-tension magneto and jubrication is by constant level subash and earn owns.

A leather faced cone clutch is employed with auxiliary springs and power is transmitted through a selective slid-



Pederut Truck Hauling First Lond of Lumber to Panama-Parific Exposition tirounds at San Francisco, tul,

the same load and makes the same rate of speed.

"Manufacturers agree that 12 miles an hour is the speed that a track should make, and that it should not be driven at a higher rate. If the 48.6 horse-power track were rated at 49, the few would be 33.6.75, the 46 horse-power would pay pay 33.0 and the 35 horse-power would pay only \$17.30, and while doing equal damage to the roads in every respect. In other words, the 48.6 horse-power more track is obliged to pay more than twice as much as the 35 horse-power track, simply because it has a larger entitie. It goes no fasier, carries no larger load and does no more damage to the road.

"We have, therefore, suggested the following scale for motor trucks, which would make an enormous Increase in the amount of registration, and it seems to us would be make fairer than the scale proposed: One ton, \$57,0 two, \$57.00; three, \$10; four, \$12.50; the, \$15,0 t, \$47.50; eveen, \$20; eight, \$22.50; nine, \$25,10, \$27.50; over 10 tons, \$50.

"it is doubtful if a motor track will be built that will carry over 10 tous, but if the manufacturers should conclude to put on a jumbo we believe they should pay for it, as the roads are not fit to carry over a 10-ton load at the present time. The few would be based upon the tonnage guaranteed by the manufacturer for the track. He could not guarantee it to carry a small amount, as he would ting gear providing three speeds forward and reverse. Final drive is by side chains. The front axle is of the 1 beam section type and the rear member square. Timken bearings are employed. The tires are solid, 35 by 3.5 inches front and 36 by four inches rear. The driver's position is at the left with left hand control.

NEW YORK'S ANNUAL PARADE.

Preparations for the annual commercial vehicle parade in New York City under the auspices of the Motor Truck Ciub, April 13, are progressing satisfactority, and the committee reports that it already is assured of more cars than have ever taken part in a similar event in this country Most of the leading dealers have shown a disposition to co-operate with the club in the enterprise and have urged their customers to join in the plan. Entirely aside from the trade, however, the civic is anxious to get as large a representation of individual owners as possible, and to this end a special invitation is issued to all owners, the committee according these a broader opportunity for advertising their own business than the dealers themselves. The chief object is to make an effective showing of motor truck representation in this centre, as an encouragement for the extension of commercial vehicle use.

FEATURES OF SANDUSKY 3000-POUND WAGON.

THE Sandusky 3000-pound delivery wagon, inilit by the sandusky Auto Paris and Motor Truck Company, Sandusky, O., is designed with a view of minimizing the time required for eare and attention, this economy being possible through unusual accessibility and simplify of construction without the sacrifice of any desirable quality. Only one type is now built, but the company is to produce, as soon as this can be brought about, a lighter and a heavier vehicle, which will be nextlestly of the same desirence.

The chief feature is in the manner of installing the unitpower plant, which can be withdrawn from the chassis in 10 minutes without the use of special facilities or tools and by one man. The replacement may be made in no longer time and without assistance. A spare engine and auxiliaries may be installed in a vehicle frame, replacing one that may be inefficient, in 20 minutes. This means that with an extra power plant the owner of several wagnets with will always have a reserve that would not be possible with machines of conventional construction. There is nothing freakish in the design. It is based on sound engineering, and there is a margin of select in every mean construction.



The Sandusky Model C Delivery Wagon Physics, with Lond Capacity of 3000 Pounds.

The motor, clutch and transmission as a unit is mounted in a sub-frame which also carries the radiator and gasoline tank and their connections. The exhaust manifold connection with the muffler is telescopic, and the driving shaft is so coupled with the transmission shaft that by the release of a retaining sleeve the counting may be drouged The lifting of the steering column and the disconnection of the clutch and speed change levers leaves the assembly free in the chassis frame. Then by raising six spring-controlled plungers and operating two levers that lower the sub-frame onto rollers, the frame and power plant may be drawn out of the chassis frame. Placed on blocks or horses work may be performed with the hest of light and without obstruction. Every part is absolutely free to the workman When work has been completed the sub-frame is installed in the chassis by a reversal of the process outlined.

It is rained by the maker that the materials used are of the likelies mality, 3.5 per een, likels steel, chrome nickel steel and vanadium steel being employed for all purposes where steel would ordinarily be utilized. All parts are machined to exact gauge with special machine tools, insuring accuracy of work and interchangeability of parts. Through inspection makes possible the manticenance of this standard of production, both in the components and the assembled work

The motor is a four-cylinder, water-cooled, four-cycle I, head type with hore of 3.75 inches and stroke of five Inches. This is rated at 22.5 horsepower by the S. A. E. standard formula, but will develop considerably in excess of this being specified as 25-30 by the maker. The cylinders are cast en bloc and with the heads and the water jackets integral. The valve pockets are at the right side. The water incketing is unusually large and the greater part of the outer wall of the cylinder heads above the combustion champer is in the form of cast cover plates, each pair of extinders being served by one plate. The cylinders are cast of a soft gray from of superior grade. The core sand may be thoroughly removed through the large water tacket vents, this construction obviating the possibility of obstructions to circulation and facilitating cleaning or renair. The cylinder block is bored, reamed and after ageing is ground to precise diameter. The water jacket cover plates are fitted and the water tight joint is insured by gaskets, each plate being held by a pair of hollow study that are centred

in the combustion chambers, late these studs are fitted the compression relief and priming cocks. The cylinders are offset 35 ligh with reference to the centre of the crankshaft.

The pistons are coast of a special gray from and after turning are ground to the exact size, the pistons are channeled to limit gauges for four 2.5-inch chings that are before executive and are ground on both edges and the peripherics to the xauged size. Extreme care is taken to insure period of the prefer care is taken to insure period castings.

The crankcase is in three sections, these beling the upper and lower balves of the barrel and the caver or case for the timing gears fitted at the front, but the rear ends of the case are extended to form the housing for the flywheel, and to the heavy

Bance at the end of the extension is builted the bousing for the clutch and transmission assembly. There are two large handholes at the top of this rear case above the clutch and the transmission. This casing when assembled contains the entire mechanism of the power blant. The material used is an aluminum alloy that severe strength. At the forward end of the crankcase and a cibler side of the flywhed case are very strong arms that support the assembly in the sub-frame, they being taijed to the strudy side members.

The upper grankings section is divided by a transverse who of heavy section and is strengthened by hridgework. The lower half is similarly divided with compartments of treetly beneath each crankthrow, and contains the oil reservoir. The top half ends and the central web earry the large main bearings, the camshaft and its hearings, the timing cases and their bowsing.

The erankshaft is a special analysis nickel seed drop forging with the flywined flange forgred integral, which is heat treated and is ground to limits for all bearings. The shaft bearings are of large dameter and length and are of a fine quality of bearing metal. The bearings are retuined by heavy boils and castellated mits, four at each



I nit Power Plant of Sandusky Beltvery Wagon Withdrawn from the Chassis for Examination.

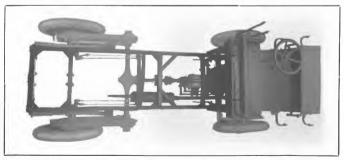
and and two at the centre bearing. The camshaft is special analysis nickel steel drop forzing with the came Integral. This is hardened and ground to limits, this insuring the size of the three hearings and the accurate formation of the cames and certainty of valve timing.

The connecting rods are steel drop forgings of I section that are fitted with die cast phoenix metal bearings at the crankpins and with bronze bearings at the wristoins. The wristpins are steel tube, carbonized, hardened and ground and are fitted into the piston bosses and retained by large cotter pins. All pistons, wristpins and connecting rods and their bearings, are weighed and, when assembled, perfect balance of the reclurocating parts is insured. The valves are of large size to obtain positive exhaust of the burned gases and to secure adequate charges of the fuel The heads are of 3.5 per cent, nickel steel welded electrically to carbon steel stems. The valves are accurate-Is ground and the stem ends are case hardened. The valve lifters are of steel and the cam contacts are steel rollers. bordened and ground, revolving on hardened steel pins The valve stem contacts are fitted with adjusting screws and lock nots and with fibre inserts to eliminate noise. The valve lifters are set in die cast guides that are held in the curine case by crab yokes. The valve guides are iron casthigs pressed into the cylinders. These guldes can be replaced when worn. The timing gears are with wide faces, that at the right side driving the canishaft, and that at the left side driving the water pump, an outside extension of this shaft driving the magneto.

The engine is rooled by the circulation of six gallons of water through the large jackets of the engine, forced by a centrifugal water pump of unusual size. The water enters the cylinders at the base of the jackets through a two-way inlet and the liquid is directed around the cylinders, and then flows outward through a manifold with outlets jocated be the centre of the twin cover plates over each pair of cylinders. The manifolds are copper tube with rubber unions. The water is cooled by a tubular radiator of stout construetion and radiation is increased by a six-bladed aluminum fan that is carried on a bracket located forward of the cylinder block. This bracket has a block carrying the ball bearing for the fanshaft that is supported by two strong helical springs surrounding the guides for the block. The fan is driven by a flat belt from a bulley on the crankshaft extension and any lengthetting of the belt through wear or stretching is compensated by the springs supporting the fanshaft bearing block

The jubrication of the engine is by splash with flywheel distribution. The reservoir integral with the base of the crankcase is filled with oil and this is so designed that a limited quantity flows into the base of the compartment in which the flywheel revolves. This oil is carried upward by the flywheel and drains into a series of ducts cast in the upper and lower sections whence it is distributed to the pits under the crankthrows. The sweep of the connecting rod ends into the oil gits causes a spray of oil to fill the engine case, lubricating the main, ramshaft, counceting rod and wristpin bearings, the cams, valve lifters, the timing gears and the cylinder and idston walls. The timing gear on the crankshaft is driven in an oil nocket and from this the other gears are constantly inbrigated. The excess oil is drained into the oil reservoir and is awain carried through the system

The lightlen is by a lark-tension West magnetic that is driven by a coupling from the water pump slot! In this histrament the advance or regarding of the spark is are unpanied by rocking the magnets, which predices a uniform spark at all speeds. It is claimed that there is no position of the familion beet at which the engline may not be strated by the magneto without difficulty and for thus reason there is no other mans of ignition necessars. But one set of



Plan View of the Model C Sandanky Delivery Wagon Chassle, Showing the Chain Cases and the Radian Rode



Left Nide of the Sandusky Unit Power Plant, Showing Water Pump, Magneto and Fau Hencket with a Spring Valuinfined Belt Tension.

spark plugs is used with this installation.

The carburetor is a foat feed automatic type that will produce a inform quality of gas at all entitie speeds. The inter manifold is very large and with straight leads to each pair or cylinders, the fresh gas aweeping the electrodes of the spark plugs and cooling and cleaning them. The distribution of gas is very even. The foel is feel by gravity from a tank of 12 gallons capacity. The radiator is carried on spring supports in a frame at the front end of the sub-frame on which the power plant assembly is installed. Above this and similarly mounted on springs is the gas-line tank. The connection with the carburetor is a large copper tube in which is a strainer and shut-off cock. There is a sight feed gauge on the dash that shows the quantity of fuel remaining in the tank.

The clutch is of the cune type. The cone member is faced with asbestos fabric that vannot be affected by best and its efficiency is not impaired by saturation of oil, while there is a custioning effect at engasing caused by flasyrings henoral the facing, that lissures against all jarand joits. The clutch spring is strong but the operating levers are so compounded that its operation is very easy.

The transmission is a selective design giving three forward and one reveres speeds. Both the driving and the counter shafts are of chrome nickel steel, hardened and ground, and they are mounted in bills grade annular ball bearings. The gers are 3.5 per cent electric furnace nickcl steel, with broad faree, long bulls and accurately cut study teeth of large pitch. The fixed gears are keyed to the orbits.

This entire assembly is earried by the sub-frame and by the removal of the sub-frame from the chassis in the manner described, work may be performed on any one of the groups without breaking any connections and without disturbing the relations of the different members. No tools or wrenches are necessary.

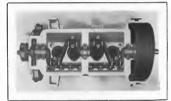
The transmission driving shaft is coupled to the main



Top View of Sandusky Pylinder Assembly, Displaying the Large Pinles Covering the Water Jackets and the Plywheel and Transmission Lases,

driving shaft by a movable sleeve or rollar that may be quickly disconnected. Back of this is a universal joint, the the main shaft, a second universal joint and then the plain shaft. The slatt is supported from the centre cross member of the chassis frame. The drive is by a plains and bevel kear to the jackbaft. The jackbaft housing is pressed steel. The differential case is mounted on Timben or order bearines, that are adjustable. The driving shafts sate is the case when the dead of the differential case is mounted on timben in the dead for a state is by double side chain that are enclosed in dust, and water tight cases that ine packed with great-The operation of the chain is no universe.

The chaosis frame is a special design of chrome nickl steel, channel sertion, two liches depth and four tacks width, 1.25 inch thickness. It is well braced by cross members and gusser plates. It is dropped in front to carry the sub-frame of the mitt power plant. The from aprings are seeml-elliptic, to inches length and two liches width, win It leaves, the rear springs are three-quaterse platform, the side members beint 40 inches length and two inches width, engli leaves, with an auxiliary apring over the rear atle 38 inches length and two inches width, of six leaves, 43 springs are vanadium steel. The rear axie is a rectangular drop forchip of 3.5 per ceat, nickle steel with the wheel spindles fitted with Timken roller hearings. The front atle le a similar forching with Elliott type yocks with a roller



Hotlom View of the Sandasky Engine Case, with the Big Male Hearings and the Spiral-Cut Timing Genes.

thrust hearing at the top of the stevering knuckle. The wheel spindles are fitted with Timken roller hearings of large size. All the wheels are fitted with cast steel have with generous fianges at the spoke butts. The relation of the rear axis is preserved by heavy radius rods that are stached to the rear axis and to the jackshaft housins. The wheels are artillery type, with 14 spokes, and are 40 locked diameter for solid tire equipment and 36 luches diameter for nonumatic tires.

The control is by a hand wheel at the top of a vertical steering column that can be lifted from its connections for the removal of the power plant, by a clutch pedul and a service brake pedal, hand levers that change speed and operate the emergency brake, and fuel throttle and ignition levers mounted on the steering column below the wheel. The steering connection is a double screw type of substatitial construction, all wearing parts hardened, with adjustments for compensating wear. The brakes are internal expanding, the shoes being faced with thermold. The brakes are large and have great endurance. The drive is at the left side and the hand levers are mounted at the side of the driver's seat outside the frame. The speed of the waron is 15 miles with solid tires and 20 miles an hour with pneumatic tires. The wheelbase is 105 inches and the tread 56 inches The turning radius is 40 feet. The loading platform is from 42 to 56 inches width and eight to 10 feet length. The normal capacity is 3000 pounds

MACK IN NEVADA MINING SERVICE.

The Jersey Valley Mines Company, Battle Monntain, New, has been operating a Mark truck, made by the International Notor Company, at its Stack plant in Allentown, Penn, in mining service during the past year, and the result of this experiment, for such it was regarded by the owner, is told in the following extracts from a letter from William F Junkham of the mining-concern:

"To begin with: The truck, loaded at Newark, N. J., arrived in good sings, It days after shipment. We Immediately filled the gasoline tank, started it on the second turn of the crank and began clearing the freight yard of the accumulation of mining machinery, lumber, provisions, etc. All of the adjustments were perfect as sent from the factory. The following day wages it a trial with distillate as fuch, the only adjustment necessary being the addition of a hot air insake carburctor, leading directly around the exhaust pipe, this being required for the proper vaporization of the heaver fuch.

"Our first trip over the desert road was one of construction. We fastened behind the car a drag made of two nine-foot lengths of 20-pound ralload rail, and dragged this over the 46 miles of road to

the mines, a same of four men following to remove loose since we see that the conlowing to remove loose since we see that the deep amount the road and fill the deep ruts made by the freight wagons, it which we were successful, it as there has been no rain in this as there has been no rain in this we filled into the ruts is now a mass of fine dust, through which we we piew to a depth of 12 to 14 lines in Imany places.

"It is hard, unless one actually insetravelled over these desert roads to imagine just what they are like, particularly as you that outling like, them in the East, and I give you this description, as it is of course necessary in order no jerrly to appreciate the performance of the truck.

'Our road lies down the length of a vailey with high

monatatios on ether side, and in the month of March, when the snow melts rapidly from the mountain adea, when the snow melts rapidly from the mountain adea, many brooks and small rivers flow down into the valley and serous or rondway, with the result that after pears of this treatment, the road is crossed by many guilles and brook besid from three to 19 feet deep, few which have honks less steep than 45 degrees. This is the usual considered inevitable, although in time we hope to improve this particular road greatly.

"Our running time has been 9.5 hours going out with a load and soven hours coming back empty. The time taken by a mule team with a six-ton load and 12 mules, is three days going and two days coming back, the freight charge being 120 a ton. A day's rest is necessary between loads. Therefore, while the mule team is delivering six tons, we can deliver 15 tons with the truck. The difference in cost a ton can be imagined easily.

"As far as the power goes, we could cut the above time much further, but would consider it rank abuse of a good machine to do so with the present roads. In fact, had we not such an accumulation of freight wheh is needed at the mine, we would keep the true k off the roads entirely, intil we could get rain to harden them and make travel more comfortable."

STANDARD OIL BUYS G. M. C. TRUCKS.

One of the best arguments in favor of the commercial vehicles is the far that large corporations are replacing their horse drawn equipment with the mechanical transport. These concerns watch operating expenses very closely. They must be kept to a minimum and the adoption of trucks means that the heads of the companies have investigated the automobile and are satisfied that it is both efficient and economical.

The Standard OII Company has placed a large number of trucks in operation at its different braiches and recently installed a fleet of 2.5-ton G. M. C. trucks, made by the General Motors Truck Company, Detroit. In the accompanying Illustration is depicted one of the machines of the fieet installed at Kannas City, Mo. Specially constructed silks are fitted to the frame for the purpose of carrying large oft anxies as will be noted in the picture.

The driver is protected from the weather by an ample sized can which is enclosed by means of curtains, and a



time of a Fleet of 3.5-Ton G. M. C. Trucks in Service with the Standard Oil Company at Kassas City, Mo.

feature of the construction of the top is a projecting bonnet, which, tike the top, can be folded back. The vehicle is propelled by a four-ylinder, four-cycle, water-cooled motor having a five-linch bore and five-linch stroke, rared at 30 horsepower. A feature of the power plant is that it is removable, belief mounted upon a main sub-frame. Ignition is by Nien manneto with storage hatteries in reserve and dual lightlon is provided by two sets of spark plusa. Lubrivation is by spalah. A multiple disc clutch is sutilized with a progressive type of transmission, this providing threespeeds forward and reverse. Final drive is by side chains. Two sets of brakes are fitted, of the expanding and contracting type, these being located on the rear wheels. The front springs are semi-elliptic with platform at the rear, and an auxiliary member is also fitted.

NEW MOTZ TIRE AGENT.

The Motz Tire & Rubber Company, Akron, O., maker of Motz tires for gasoline and electric commercial and pleasure vehicles, announces the appointment of the Standard Tire & Rubber Company, 104-105 Portland street, Boston, as its representative in that city and vicinity.

EFFECT OF SPEED ON TIRES.

Experts Interested in the commercial vehicle because of its economic possibilities are agreed that the driver who throws discretion to the winds and operates his truck at an urreasonable speed is unquestionably the most expensive feature of the maintenance account. The manufacturers, in particular, attack the speeding driver and his methods. They argue that speeding is by all odds the most important of all deteriorating influence a to which tires are subjected. Commenting upon this situation, F. P. Phillips, manager of the solid tire department of the United States Tire Company, New York (Dr., 8808).

"Beyond any question of doubt, the speed maniae is a menace to the track industry. Putting saide every officonsideration—wear and tear on muchinery, undangering the lives of pedestrians and violation of sane traffic rules the speeder is an undestrable party for the reason that he costs his embover a great deal of unnecessary money.

"It makes no difference how well solid threa are madot to what extremes the manufacturer goes to britisy them asalmst the Increasing Knocks of road travel, they will not withstand the abuses of the speed mathies. Speeding Is an evil that ran result in but one thing-decreased tire unlicage and Increased three values.

"Demonstration has proved that at an average speed of 12 miles an hour the life of a tire is about twice shat it is at an average speed of 20 miles an hour. Still hisher speeds reduce the life of the tire proportionately. Therefore it should not require any great amount of meditation to determine the effect of constant speeding upon the owner's trie bills.

"There are a great many conditions and abuses calculated to shorten the life of a selld tipe, but of all these lates to have no hesitancy in placing speeding at the top of the list. Every manager of a motor service should lineat more manager observance of moderate speeds. Economical tire service can be secured in no other way.

"As a simple illustration of the effect of first driving on solid tiles, take two locometries traveling at a speed of say, five miles an hour, and bring them into collision. The result is not serious. However, if you take these same locomotives, traveiling at the rate of 30 miles an hour, and jam them together, something is bound to happen. It is the same with solid tires. When a moderate speed is maintained, road obstructions are of slight consequence, but when the truck is sent along at a fast rate, the reverse is true."

KNOX BUILT FIRST TRUCK.

What is chalmed to be the first gaselline motor truck was the three-wheeld delivery wagon consurated for the department store of Smith & Marray at Springfield, Mass, by the Knox Automobile Company of that city, in 1961. However, the owner of the first rubber tired motor truck was the Adams Express Company, which ordered a Knox truck for delivery in Worcester, Mass, Nov. 2, 1903, and a second one of the same make for New York City the following day.

Two of the earliest owners of Knot three-wheeled cuswere men who have become famous as automobile designcrs. One of these was C. R. Creuter, designer of the Matheson, and the other, Charles Y. Knikht, Inventor of the Knight motor. The machine built for Smith & Murray in 1901 was the forerunner of a rapidly growing commercial vehicle business, and an offshoot is the fire apparatus line which has developed with leaps and bounds, until today nearly every large community in the country has one or more pieces while several cities and towns are completely changing over thely enuignent.

BRUSH FOR RURAL CARRIER.

In an effort to determine the relative cost of the automobile and horse equipment in rural mail delivery, a carrier on one of the routes leading out of Eldorado, O., recently selected a Brush runshout, made by the Brush Runch Mouter Company, betroit, a constituent of the United Sixtes about Company, with which to make the test. He found that the actual cost for gasoline and oil for the trip was 14 cents as against a forces for the horse and wagon.

In the first place it should be stated that the distance to be covered was 26.25 miles, and that 125 stops had to be made. The automobile completed the task in 2.35;00, while the horse needed approximately six hours. It will be seen that not only will the Hirsh ramador do this work at a satum of more than 200 per cent. In expense, but will sixe the earlier some three extra hours each day. He proposes to utilize the ear in the livery business after finishing his day's work for the government.

ECONOMY AND EFFICIENCY.

Talk to a man in real figures and he will listen every time, especially if those figures refer to the cool of operating motor trucks. It is pretty generally recognized by commercial vehicle manufacturers today that it is an actual illustration of service cost under average conditions which unkes its appeal, combined with a proved statement that the truck will cover more territory in a given time and consequently carry more goods. Here is an instance:

The Arms White Lead & Color Works of berroit has had in operation for some time a five-ton (5, M, C webbel, made by the General Motors Truck Company of that city, and since his inectiation has been keeping a strict around of its performance and operating cost. A statement tested recently by it proves interesting not only from an economical standpoint, but the comparison made with the borse system clearly emphasizes the advantages of the motor truck and the saving and efficiency resulting from its nec. This particular (6, M, Cook the place of two terms and two men, but for a month both systems were in operation in order to make the comparison.

While the two teams were only able to earry 220 tonor material during the month, the truck during the same period carried loads aggregating 780 tons, or three times more than the amount drawn by the horses. As to the terfitory covered, and this is one of the very important items, the teams negotiated 1144 miles against 1426 for the truck. It will be seen that the me-hanical transport was able to cover a third more territory than the two reams.

The biggest surprise, however, was in the matter of expense. It took \$229.16 to maintain the two teams, pay the drivers' wages and feed the horses. The motor track livolved an expenditure of \$132.10. This included wages of driver, gasoline and oil. To summarize, it not only cost \$17.06 less to maintain the power vehicle, but it was posible to cover 286 more miles and carry 51st more ions of material.

LAUNDRY BUYS VELIE CAR.

There is a growing tendency among laundries to adopt the commercial vehicle. The automobile has proved lie efficiency and economy in this work where the deliveries are not confined to a few sections in the city. The Talon Laundry Company of Worester, Mass., recently esprimented with motor cars and the results were so graitfylist that an order was placed with the Acme Motor Car Company of that city for a Velie truck, made by the Velle Motor Vehicle Company. Moline, III.

The Devoted to Motor Driven Business Vehicles of All Classes.

VOL. III. PAWTUCKET, R. L. MAY, 1912 No. 5

MOTOR EQUIPMENT IN MUNICIPAL SERVICE.

Experience of Pawtucket, R. I., Demonstrates That Substantial Economy and Undoubted Efficiency Result from the Use of the Mechanical Transport in the Street Department for the Suppression of Dust Nuisance.

VERY municipality of proportions must afford to its citizens such service as its resources may justify. There is a wide variance as to requirements, but it is characteristic of American citizens to demand of a city or town whatever attention may appear desirable, it being assumed that the community as a whole ought to bear the expense of necessities or conveniences that in reality benefit a comparatively small number. Without question it is impossible to provide all that may be desired, but, aside from the matter of political expediency, there are certain classes of serv-

ice that must be provided

The municipai government must always regard its financial limitations. at least in theory, and the generai experience has been that revenue is never adequate to provide all that is wanted by the citizens There are certate divisions of the service that may with reason be restricted, temporarily, perhaps, while others must not

atant but have a

reasonable reserve to cope with such exigencies as may arise. While it is a fact that each citizen will unhesitatingly demand whatever may be considered a public or even a personal need, there is equal unwillingness to approve a rate of taxation that will yield sufficient revenue to meet all authorized expenses.

The community government usually ices another handicap in the fact that political expediency has caused the enactment of state or local laws limiting the hours of labor. and as a rule the work that is performed is materially less than what might be accomplished by a private corporation or firm for a given price. This is stated for no other reason than to emphasize the necessity of economizing the time of those employed by municipalities. That is to say, with the limitation of appropriations and of the hours of labor, and with the demands in excess of the departmental capacities and constantly increasing, there is extreme need of facilities that will either better the service at no additional expense or accomplish an actual saving,

There are some divisions in which time is the greatest factor and of these the most important is that affording

protection against fire. The utility of the motor driven apparatus I s such there can be no argument made against its use, and for the police department the automoblie vehiele is so su perior to other forms that it is not necessary to

the two departments specified, where time is one of the most important factors in obtaining satisfactory

expatlate in either of

protection there could be first the main requirement has been sufficient capacity to supplant the largest and heaviest apparatus, there being some doubt as to the reliability and endurance of the motors in the absence of specific experience. So far as the

second is concerned there has been abundant evidence to It is outside of these two divisions that the power conveyance has been least used. There is apparently a beltef that it is not practical to give over the use of horses and carts because of the class of work that is performed in



on Equipment That the Supplemed 19 Water Tank Wagons, no issue made even were the expense greater. With the

establish the superiority of the automobile.



Series of Hand Levers at the Left Side of the Driver's Sent by Which the Pumpage and the Distribution of the Oil is Controlled.

street cleaning, street sprinkling, garbage collecting and other sanitary service, to say nothing of the varying conactruction such as street building, water works extension and maintenance, sewage system development and care, as well as other essential attention to city property.

In regarding the average municipal expenditure and the possibilities for economy it must not be believed that there are the same incentives to save money that would obtain with the business of the private enterprise. While it may be that some with say there should be no difference it is a fact that economizing is often not so much the object sought as to furnish employment to deserving voters who are willing to do the least that is possible for wage or salary paid.

to them. Where this is the condition obtaining it is useless to advocate economical methods.

In any event it is not practical to expect to better or improve a service by the changing of apparatus-that is, from animai to mechanical vehicles-to any great degree. The mere possession of the equipment is one thing. The essential is to make whatever change is necessary in the manner of use to secure the greatest practicul use and consequent economy. This is not a radical recommendation. It follows that there must be rejection of the old to take advantage of the new, and if there is to be merely an increase of the service without additional expenditure the public is distinctly a gainer.

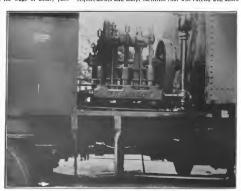
It will be admitted that it would be idle to use trucks or wagons as carts are or have been used for street cleaning, for example, because there would be the waste of time in loading the refuse and dust from the high ways and the only saving would

be in the time of carage. If the builage were a considerable dislance the motor truck would have the advantage of speed and capacity, which might be sufficient to equalize the expense, but there would not be a large measure of saving. Hesides, the truck would, with a drive, do the work of sercral men and carts, which would mean less work for somebods.

To illustrate the matter of method it may be pointed out that ence the streets were leveled by use of the shovel and hoe. Later came the barrow on the dirt ways. Next the paving was swept by hand brooms and the dirt carried away by carts. The horse brooms were the next facility. It will be noted that each improvement has been made with a view of expediting the work and improving it so far as this may be done. in other words, the utilization of better tools or apparatus made it necessary to

change the methods the vogue. Now, to take advantage of the increased capacity and superior mobility of the trucks is imprentive to abandon the old systems and adopt what will best serve. So long as there is no disposition to do this there can be no change for the better.

It is not to be assumed that any one system will be satisfactory to all communities and their requirements. It is far more reasonable to believe that those responsible for the administration of manicipal departments can determise what will best serve them with the conditions obtaining but it is a fact that it is far more economical to abandon equipment that may appear to be sufficient for all immediate requirements and adopt facilities that will stread and affort



Belt Driven Pump That Forces the Gil from the Tank Lader a Creasure of 100 Pounds to the Square tuch and Morda Equal Distribution.

Oil Distributor Carried on a Frame Adjustable for Height and Masked to Present the Fluid rect the nien in a general way. Of Spraying Beyond a Determined Area,

a far more satisfactory service. As a business proposition it is far better to discard what is known to be insufficient and take up with that which will be better from every view point, although there may be an initial expense of considerable proportions.

To illustrate this in a manner that cannot be misunderstood the experience of the city of Pawtucket, R. I., has a practical value, because it demonstrates the possibliities of the adoption of methods that are reasonably progressive. Pawtucket has a large mileage of macadam and gravel streets, well constructed and well maintained. For years the highways had been watered from early in April to freezing weather in the autums, with the usual results from such treatments. As the city increased in population the demand for dust suppression at least kept pace with the growth and it will be realized that this could not be and was not denied. As this article deals with the possibilities

for Improved methods and apparatus it is appropriate that there be some explanation of the changes made that resulted in the utilization of a truck for a work that required 19 watering carts, 19 pairs of horses and 19 drivers.

Buring the season of 1949 the city suppressed the dust by the use of water, using the equipment stated. The city owned the 19 water tank wagons and during the period of service a pair of horses for each cart and a driver were hired at a cost of \$4.50 a day, this bringing the cost for each cart, exclusive of the interest on the investment, depreciation, water charges, insurance, etc., to \$27.50 a week, or an aggregate of \$522.50. As the city owns its own water works the water was sunplied the department at the lowest charge-\$60 a million gallons

which is probably a third less

cities. The work was systematically conducted, the city being divided into 19 districts in which one cart was worked each day rain did not fail. These districts were not count as to size they ranging from 37,100 square vards to \$4,600 square yards of street area, and each driver was expected to so apply the water that the dust would be suppressed uniformly and to make as many applications as was possible. For the purpose of minimizing time in distributing the water standpipes were located as frequently as conditions instified. The expense of the standpipes was not included in the cost of watering.

The entire service was under the supervision of an inspector who was required to visit every section of the city and see to it that the drivers were doing the work required of them and to dicourse it was necessary the inspec-

tor have a horse and huggy to drive about. Some of the streets were sprinkled more frequently than others, the more generally travelled ways receiving the most attention.

The cost for watering 863,000 square yards of street during the year of 1909 was 1.4 cents a square yard, this including interest at four per cent, on the cost of the carts, water, new apparatus, repairs and supervision, but not the depreciation charge for the apparatus. it might be said that this item was taken care of by the repair account. The cost for the work varied in the different districts from & cent to 1.8 cents a square yard, which correctly represents the difference in the service. It might be well to direct attention to this particular condition because, with the use of water, the dust is suppressed only for a comparatively brief time, especially in hot weather, and the more insistent the demand for service there is no possibility of giving more than the normal distribution. In fact it may be said



than the average price paid by Manner of Distributing the Oil, it Covering a Section of the Highway Seven Feet in Width,



The Emerson Dry Street Succeing Machine, Which Has Bern Experimented Extensively in New York, N. Y. the experience is that when the weather is extremely hot the horses are not able to do as much as they would with a lower temperature.

There is always a considerable difference between the theoretical and the actual work accomplished because of the time loss by the men, and the people are the losers because the losers

The department of public works system, taking the maximum work of the carts by district, permitted the watering of from 2.78 to 6.38 miles daily, there being a total of 66.4 miles of highway in the districts served, allowing an average of 22 feet for street width and 13,000 square yards to a street mile. It will be understood that this required from two to four applications.

The use of oil was begun in 1910 and for this service, to cover the same districts, approximately 27 per cent. of the maculam and gravel streets, three waterling carts were used. It was found that while the mileage was increased so that each eart served an average of 22 miles this was not satisfactory because of different character of distribution required. To illustrate, the earts were equipped with fan sprinklers from which the oil flowed by gravity. When

springers from word oil was fairly even, but as the head was diminished the oil was spread to Increased depth and over a lessened area, filling the depressions and creating pools from which the oil was thrown by passing vehicles, causing complaint from the owners of conveyances. Not only this the oil was often blown by high which on the walks and private property, resulting in extreme disastisfaction, while it also was carried on the feet of pedestrians into buildings and houses.

So far as suppressing the dust the oil was decidedly superior to water. The oil was received in tank cars and taken by a spur Irack to the city yard where it was drawn from the tank and spread. The capacity of the tank wagons was 600 gallons each, and a 10,000-gallon tank containing approximate-by 17 loads could be empted generally within the time allowed before demurrage was charged—four days. It should be understood that oil cannot be applied when the surface of the ground is wet and occasionally the work of distribution was eduaged. It was decided that this was a satisfactory manner of handling the oil, although it would have been practical to have constructed a storage tank of large capacity and stored the oil to be drawn upon as desired. This would have prevented waits for shipments and the payment of demurrage, but the cost would have been considerable.

Receiving the oil in this manner developed another condition that was really serious. It was necessary to haul all the oil from the tank car to the different sections of the city where it was used, and careful study proved that fully super-cent, of the time of the carts distributing the oil was given over to hauling the oil and returning with the empty tank. In other words, four out of every five days were practically unproductive of labor. This condition could not be changed with the use of the carts and horses. But with this large factor of unproductiveness the cost of the oilling was not greater than of watering.

The experience was that It was best to make frequent applications of oil, the coats to be in the proportion of. I go lon to the square yard, making at least two distributions and a week or more apart. This work necessitated a great travel of the carrs, while there was the same objection to them because of the uneven character of the distribution.

The city's watering equipment consisted of the 19 tank caris that cost \$475 each. The interest on the investment was \$270 figured at four per cent. The depreciation was not estimated and was met with a repair expenditure of \$138.7.30 in 1909. The net rost of the carts was \$712.5 plus the freight. With the use of water the 19 carts was not sufficient. With the use of oil three carts met all requirements. With the necessity of baving a central location from which the oil might be distributed and utilizing the tank cars instead of a storage tank it was considered best to make an entire change of equipment.

When practical experience had demonstrated that oil was desirable from every point of view for the supression of dust the commissioner of public works was authorized to procure such apparatus as would in his judgment after the gratest economy and efficiency. One purpose was to minimize the unproductive labor and the other was to better distribute the oil, so there would be no waste and eliminate any cause for compilatint.

The department prepared plans of an apparatus that



tank cars and taken by a spur Combination Water Tank and Street Sweeping Mater Driven Apparatus That Hun Bet tank cars and taken by a spur Adopted by a Number of European Cities.

was decided would answer every requirement and found that it was necessary to build it in part. First a three-ion Gramm truck was purchased and from this the body was removed. Then a sheet iron tank of 500 gallons canacity was built to specification and this was installed on the chansis. This size was believed to be best for all-round worth and it was proposed to distribute the contents of an 800-gallon tank in 10 loads. The tank was so constructed that it could be removed from the chassis in a comparatively short time.

Between the forward end of the tank and the driver's cah was located a bening pump of the three-plunger type and the 16-inch driving pulley was belied to a seven-inch pulley fixed to the clutch shaft, forward of the transmission. The reason for this was that the pump might be driven at all times at engine speed. A standplpe was placed in the tank at the left forward corner with such clearance as to insure practically complete clearance of the tank. The connection with the standplpe and the pump was made so that there need be no pressure whatever in the tank, and the oil be forced by pump to a pressure of 100 pounds to the square inch through a line leading to the spray header suspended by tubes carried in guides at either side of the rear of the tank, these tubes being so constructed that they might be additionated for helpful.

The pumpage is controlled by four levers at the left side of the driver. One of these operates a relief valve so as to diminish the flow of oil into the pump. A second permits the bypass of oil so that there may be a diminish of pressure at the header when climbing a hill allowly, for instance, and the engine is running faster than it would normally on a level. The third will abut off the oil supply to header near the pump, and the fourth will shut off the oil supply close to the header so that there will be no flow whatever, as when crossing a walk. It was believed that there might be some difficulty experienced when the speeds of the truck were changed, but it was found that this condition was not realized.

The capacity of the pump was such that a tank of oil could be distributed in about 40 minutes and as the flow was regulated at the header and directed downward onto the burface of the roadway the fluid would penetrate the surface tery rapidly. With the tank wagons it was necessary during cold weather to heat the oil to a temperature of 1.50 degrees at the tank car by a coil of steam pipe to insure penetration, but this was entirely overcome by the use of the presented of the pressure distribution. That there might be no oil syray blown about by high winds the header was masked was masked or was masked or was masked or was masked or roadway.

Since the original construction several changes have been made in the apparatus, the pump pulse being redured from 16 to 12 inches diameter, and the number of outlets increased from 13 to 26, this giving a more equal distributing pressure than to vary the proportions of the outlets. The oil la pumped so long as the truck is movins or the engline is in operation. The control is very precise, as it is possible to oil a road to within an inch or two of a given point, and to begin or cease oiling whenever desired. This evenemes of distribution is the same no matter what the quantity of oil in the tank. The tank truck is operated by two men, one driving and the other manipulating the levers by which the distribution of the oil is regulated.

When the truck was first placed in operation it was found necessary to do some experimenting for the crew to become familiar with it, but in a comparatively short time the men mastered it and were able to do exceedingly satisfactory work. In fact, one quality is that within a very few minutes after oil has been applied in light coats one may walk about on the road without any of the discomforts or annoyances that are experienced with other methods of oiling.

The equipment replaced the three watering carts used for oiling and not only does the work, but does it in every does it never the chine working all the time for any et the needs of the city do not require it, but to indicate the capacity it may be said that often a tank car of 8000 gallons is empired in a said that often a tank car of 8000 gallons is empired in a concasionally from 16 to 12 hours may be necessary for such work because of the distance of the distribution from the track could work on a 6000 gallon basis every day that the weather would neem the anolication of oil.

During 1911 the truck was driven approximately 10,000 miles, the greater part of this in street oiling, and a road area of 835,000 square yards was oiled at a cost of 1.17 cents a square yard, considering oil and labor. With the cost of renafix and supplies the cost was 1.25 cents a square



Truck Adapted for the Collection of Garbage by the Saultary Departments of Several Cities of France.

yard. The saving shown is .15 cent a square yard, for the theoretical cost of watering was 1.40 cents, but this was somewhat increased because the actual work expected in ever what is realized, there being more or less shirking by the men.

Resides the improvement of the distribution there is a distinct saving of 10.71 per cent, and an actual economy of probably 15 per cent, although the full capacity of the machine is not as yet realized. The city distributes between 250,000 and 200,000 gallons of oil annually, this being equivalent to about 350 tank loads, taking 275,000 as the quantity used. Estimating 6000 gallons as a day's distribution and there being 100 days of the year when oilink can be done, this would show an actual work capacity of 600,000 gallons, or more than double what is now required of the truck.

But besides the oiling the truck has proven fitself especially serviceshe in other way. When the season closed the pump and tank were removed and the regular body installed and the truck was used by the water department during the entire winter, doing work that required eight hird horses and express wagons. It was included each morning with from 15 to 20 laborers and their tools and the men were carried to their work. They were brought back when the job they were on was completed, and not only saved their time, but the expense of the horses and wagons they had previously used. Besides this the truck hauled material and did no end of set (teable work. As a municipal investment it was a decided success. When the winter's work was finished it was again equipped for street oiling and it is now in this service. It is expected that with the experience of the past year it will show even greater economy.

While this is, so far as is known, the only apparatus of the kind, motor trucks have been adapted to other kinds of municipal work. For instance, the Emerson dry aweeper is being carefully tried in New York City, this heing a chassis fitted with a rotary engine driven brush at the back. The aweeping are carried up a chute over the top of the machine and into a compartment, a slight sauction preventing the dust from becoming obsorbous.

A street sweeper that has been used with considerable success in a number of cities of conlineatic Europe is a custom tank and rotary broom carried on two large steel tired can tank and rotary broom carried on two large steel tired on the paving wheels. From this tank water is distributed on the paving to to lessen the dust and make certain the collection of the foregreen the steel of the street it is collected by wagons. The apparatus is driven by a Richard-tirasler wagons. The apparatus is driven by a Richard-tirasler less than the third that the drive is by doublest of the forward wheels, through a cone-clutch to the forward wheels, through a cone-clutch to the forward wheels, through a cone-clutch are seen and countershaft. On the steering knuckets are seen and

NEW CONTINENTAL MOTOR WAGON.

E. M. Anderson and Dr. J. G. Barnadale of Superior. Wis, have neorporated the Continental Track Munitaries ing Company of that city, which has entered the commercial vehicle nedest in a Continental sugan of one to three tons continents of the continents of the continents of the present. Only one type of chassia will be constructed as present, to which will be fitted three standard bodies, one an authorized present of the continents of the continents of the statement of the continents.

Perhaps the most conspicuous feature of the car is the extreme accessibility of the motor, which is a four-cylinder unit with hore of 4.123 inches and stroke of 5.25, located in front under the footboard. When this latter is removed the whole top and forward end of the engine are easily reached by the operator from the front between the wheels. The carburetor, magnet, force feed fubriator, jump, vaive mechanism and piping are all exposed to view and readily accessible for work.

The motor is rated at 35 horsepower. The magneto is mounted on side of the crankease. Cooling water is circulated by a gear pump through a radiator which forms a part of the dash and is out of the way of both accident and

injury. An automatic governor is fitted so operator is effectually prevented from exceeding a predetermined speed.

The clutch is a cone member. The transmission affords four speeds, and the jackshint carries as the differential and sprockets, in all drive being by chain. The frame is steel, double truesed, and is mounted on semi-elliptic springs in front and full platform members in the rear. These latter are not required to take the drive thrust, substantial radiussiant radius of the platform of the first purpose. Brakes are internal expanding and external contracting.

Both axies are drop forgaings of nicket steet, lammered into shape and then special heat treated without welds. The front member is of the I beam type three inches wide, while the rear is of

while steel, three by 3.23 inches. Wheels are larger lit the rear than in front, the former being equipped with 40 by four inch solid tires and the latter with 36 by 3.5 inches. The wheelbase is 120 inches and the tread 56.



Street Sweeper and Water Tank, Driven by a Motor, Very Generally Employed by the inches wide, while the rear is of Leading Cities of Germany,

pinion reductions. The broom drives separately.

Another interesting apparatus utilized extensively in Germany is a motor driven tank carried on four steel shod wheels and carrying a rotary broom. This also sweeps the refuse into the side of the street for collection.

in France a motor truck is utilized by the sanitary department for the collection of garhage. The body is of metal, completely closed, and mounted on rollers on the deek of the chassis so that it may be withdrawn for dumping. The purpose is to facilitate the carriage of the garbage and to minimize the odor, while with the removal of the body the truck may be used for other works.

These are some of the practical uses for trucks in municipal service. They emphasize that with changed methods there is the best of reason for utilizing the superior qualities of these machines.

The Lipnard-Stewart Motor Car Company, Buffalo, N. Y., maker of Lipnard-Stewart trucks, has appointed the following agencies to handle its product: Whitney-Barney Company, Boston, for Massachusetts, New Hampshite and Vermont, and Taylor Motor Car Company, Pittsburg, Ponn.

DIAGONAL BLOCK TIRE.

The Diagonal Block Tire Company of Urbana, O., is producing a few tire, the Diagonal Block. As the name implies this tire is constructed on the block principle, each esection or block being removable independently of the others. The outstanding feature is the shape of the section, which is rhomboid, so that it extends diagonally across the tire. This feature is claimed to give greater traction and at the same time the smooth running of the continuous tire. A booklet describing the product will be malled on request.

The Luverne Automobile Manufacturing Company of Luverne, Neb., is to place shortly on the market a one-ton delivery car. The company has heretofore confined itself to pleasure car production.

NEWS OF THE COMMERCIAL VEHICLE INDUSTRY.

Buffalo's Electric Concern Makes Known Its Official Board---Several Trucks Ready for Their Initial Appearance---Other Interesting Items.

Announcement was made in these columns last month of the incorporation of the Buffalo Electric Vehicle Company, Buffalo, N. Y., with a capital of \$1,000,000. At that time little was known about the concern, other than that it was to be a merger of five companies in that city for the manufacture of electric vehicles of all types. The personnel of the organization was made, public in the election of officers April 22, and it is assured that the enterprise will not lack substantial and influential backing.

The officers are as follows: President, Samuel J. Dark, secretary of the Huffalo Dreddine Company, secretary of the German-Bock Asphalt Company and director in the Commonwealth Trust Company; for the president, A. A. Landon, president of the Clark Motor Company and auperintendent of manufacture with the American Radiator Company; second tive president, W. A. Morran, president of the Buffalo Taxi Company, director in the Buffalo Copper & Braze Rolling Mill and district manager for Swift & Co.; treasurer, Harry Yates, first vice president of the Union Parnace Company, treasurer of the Lafayette Hotel Company and vice president of the Commonwealth Trust Company; secretary, Alfred W. Thorn, president of the Thorn Comeant Company and director in the Commonwealth Trust Company; secretary.

The directors are: President Dark, Vice Presidents Landon and Morgan, J. T. Steele and John W. Van Alien. Director Steele is an investment broker and Van Alien a prominent Buffalo attorney,

CHASE COMPANY DOUBLES CAPITAL.

The increasing demand for Chase trucks, made by the Chase Motor Truck Company, Syracuse, N. Y., has resulted not only in the decision to erect additional factory facilities, but at the last meeting of the stockholders the capital was increased from \$150,000 to \$300,000. The company reports good business conditions throughout the Middle West and Northwest, where the demand for its product has been increasing constantly since the first of the year.

DRIGGS-SEABURY TRUCKS COMING.

The Drigge-Sealury Ordnance Works, Sharon, Penn, has been engaged upon the construction of 20 motor trucks, which will soon be given their preliminary tests. It is understood that the concern contemplates entering the commercial vehicle field, building mechanical transports on a large scale. These models will be produced in capacities of three, four and seven tons, respectively.

ATLANTIC ELECTRIC TRUCK.

The list of electric commercial vehicles in the market is to be augmented in the near future by the addition of the Atlantic, to be made by the Atlantic Vehicle Company, North Newark, N. J. The line will include cars of one, two, 3.5 and five tons capacity. The designer is Arthur J. Slade, who has been connected with the production of electric automobiles for a number of years, in cooperation with others who are extremely well versed with the needs of the mechanical transport.

The officers of the company are: President, McKiniey Boyle, until recently with the Continental Car Company of

Louisville, Ky.; vice president and sales manager, Ralph Sanger, formerly with the machinery firm of Wanham, Sanger & Bates. Mr. Slade is chief engineer, although he will continue his uritate practise as a consulting engineer.

INTERESTED IN HART-KRAFT FACTORY.

According to a dispatch from York, Penn., a \$200,000 corporation is in the process of formation for the juripose of taking over the factory of the Hart-Kraft Motor Company of that city. It is understood that the promoters have associated with them a practical man from the Mercedes factory in Germany; and that immediate steps will be taken to enlarge the present plant.

G. M. C. PAYS DIVIDEND.

The General Motors Company, of which the General Motors Truck Company, maker of G. M. C. ascollen and electric trucks, is a constituent, has declared a dividend of 4.5 per cent. on its preferred stock to stockholders of record April 15. The full dividend rate on this stock is seven per cent. a year, and the odd amount of the present payment is accounted for in the fact that the dividend date was pushed forward one month, because of interest payments which fell dee April 1.

DIXON COMPANY'S ANNUAL MEETING.

At the recent annual meeting of the Joseph Dixon Cradble Company, Jersey City, N. J., maker of Dixon's graphite lubricants, 3294 shares of a total of 19,000 were represent ed, and the foliowing officers and direction were redected: President, George T. Smith, the president, W. H. Corbini, secretary, Harry Dailey; treasurer; George E. Jone; assistant secretary and treasurer, J. H. Schermerbern; directors, George T. Smith, William Murray, Edward L. Young, William H. Corbin, William G. Immiscal and Harry Dailey

KELLY-RACINE TIRE DEMAND.

The Keily-Racine Rubber Company, Racine, Wis, has increased its capital by \$15.000. This move was made necessary by the volume of orders on hand, which could not be filled with the present facilities. The new capital will be used to valarge the factory, so that the annual output, which has grown to \$1,200,000 in the two years that the company has been manufacturing, will be considerably increased. George it, Wilson was recently elected president and general manager.

WOULD REORGANIZE COMMER INTERESTS.

A committee has been appointed by the creditors of Wyckoff, Chard & Particles, Inc., New York City, maker of Commer tracks in America under license from the English concern, looking toward a recreanization of the company. This committee consists of the following! H. M. Swelland, chairman: Chester Griswold, exertary; R. D. Moore, president of the Commercial Trust Company; A Hauschild of the Polack Tyre Company; A. G. Bruckman, president of the Livingston Radiator Company, and A. R. Raiston, attorney.

LAMBERT TRACTORS IN LOS ANGELES.

Pollowing the announcement that the Ford Motor Company of Detroit, maker of Ford pleasure and commercial lines, would erect a branch factory on the Pacific Coast, comes the information that the Buckeye Manufacturing Company of Anderson, Ind., will locate a plant in Loa Angeles for the manufacture of Lambert farm tractors. It will be remembered that this latter concern has been engaged in the production of Lambert friction driven pleasure cars for several years, and recently began the manufacture of Lambert trucks, as well. The Lambert tractor is as entrely new proposition, although it has been experimented for some time at the Anderson factory. It is designed especially for use in orchards and in field work upon the farm

It is understood that the Pacific Coast branch will be conducted as an entirely separate institution and that no pleasure cars or trucks will be constructed, at least for the present. J. W. Lambert, treasurer and general manager of the company, has been spending considerable time in the vicinity of Los Angeles, studying the market and the situation.

The Lambert tractor is a three-wheeled vehicle, the single wheel being located in front. The driver occupies an iron seat of the skeleton type placed at the extreme rear, steering being accomplished by an ordinary automobile hand wheel immediately in front of the operator. The column extends to a point near the centre of the vehicle and thence by the usual arrangement to the front wheel. The motor is located over the rear wheels, and the patented Lambert friction transmission is in front, and placed in a position exactly the reverse of that in the Lambert pleasure cars. It will be seen that the motor drives forward to the discs, which is turn drive backward to the traction wheels,

The rIm of the front wheel is a broad band of steel with rubber in the centre, so designed that the rubber is utilized for travel over hard surfaces, and the steel comes into play the moment the wheel sliks in soft ground. The rear members also are shod with rubber, but in addition metal cleats are fitted for additional tractive effort when needed. The motor is a rated at 40 horsepower, and is of the four-cylinder, four-cycle type. The entire design has been with a view of providing for an extremely low centre of gravity and the machine has been kept down to a height of 42 inches.

MONITOR SALES FORCE IN CHICAGO.

The general sales and publicity departments of the Monitor Automobile Works, Janesville, Wis, maker of Monitor commercial vehicles, have been removed from that city to Chicago, where headquarters have been established at 1421 Michigan arenue. J. E. Nordling, secretary and treasurer of the company, is in charge of the Chicago office, with F. W. Stewart acting as sales manager. President Westerlund remains in charge at the factory in Janesville.

CHANGES IN GOODYEAR FORCES.

The following changes have been made in the personnel of the seiling force of the Goodyaer Tire & Rubher Company, Akron, O, maker of Goodyear tires: George Bullock and Williard E. Parsons, San Francisco branch; G. R. Kreps and Frank R. Isaac, motor truck salesmen, Philadelphia; M. J. Dobler, city salesman, New York City; Woodson Reese, covering Missouri from Kansasa City; H. B. Annable, Spokane, Wash.; H. C. Falkell, Clacinanti; C. G. Woodward, motor truck salesman, Memphis, Tenn.; F. B. Sullivan and Myron T. Sparks, motor truck salesmen, Hoston, Mass.; E. C. Hied, Hattimore, Md.; Robert E. Camphell, St. Louis;

E. P. Crawley, Jacksonville, Fin.; V. D. Lersch, Buffaio, N. Y.; J. H. Whetstone, Detroit; Glen Schrader, Dayton, O.; J. J. Kendall, Charlotte, N. C.; H. Q. Tenant, Inspector adjusting department, Atlanta, Ga.; W. E. Dermody, New Orleans; G. T. Hancock, Newark, N. J.

NEW VICTOR OFFICERS.

At a recent special meeting of the Victor Motor Truck Company, Buffalo, N. Y., maker of Victor commercial vehicles and fire apparatus, Orson E. Yesger, president of the Buffalo Chamber of Commerce, was elected president of the concern. John A. Murphy was chosen vice president. H. B. Millard of Brooklyn, N. Y., was added to the directorate, with the two new officers.

F-S LIGHT DELIVERY CAR

The P-S Motors Company has been organized in Milwaukee, Wis., for the purpose of producing a new light delivery car to be known as the P-S. It is understood that this is practically a constituent of the Filer & Stowell Company of that city, which aiready has a controlling interest in the Beaver Motor Company, the Petrel Motor Car Company and other important concerns in that vicinity.

DAY COMPANY LEASES FACTORY.

The Day Automobile Company, Detroit, maker of the Day Utility car, a convertible vehicle, has lessed for five years the factory huilding recently erected at 25 East Milwaukee avenue in that city. It is of two stories, constructed of brick and will afford 24,000 square feet of floor space.

GENEVA WAGON ENTERS FIELD.

A concern which has held an entilable position in the horse vehicle industry for many years, but has now decided to enter the motor truck field, is the Geneva Wagon Company, Geneva, N. Y. Its product is to be known as the Geneva motor wagon, and while but one chassis will be provided, at least two standard types of hody will be fitted. With the open body the capacity is rated at 2100 pounds and with the full panel type, 2300. The motor is a two-ylinder opposed unit, water-cooled, located under a short hood in front of the dash. The horsepower rating is 20, with a bore of 5.125 inches and a stroke of 4.5.

UNDERTAKERS PREFER MOTORS.

A situation which will prove of interest to those engaged in the manufacture of automobiles is disclosed in the action of the Hearse Builders' association of America, at its recent annual meeting in Columbus, 0. It developed that there was an increasing demand for the undertakers wagons and hearses equipped with motors instead of being adapted for horses. The sentiment was so strong as to call for an expression of opinion among the members of the association.

TO MAKE KREBS TRUCK.

A new concern has been organized in Clyde, O., to be known as the Krebs Motor Truck Company, for the manufacture of Krebs commercial vehicles of 1500 pounds capacity. It is understood the motor will be a two-cylinder, we-cycle unit with bore of 4.5 inches and stroke of 5.5.

CONTINENTAL MOTOR'S NEW FACTORY.

What is claimed to be the largest factory building in the world devoted to the construction of motors for pleasure and commercial cars, has been erected by the Continental Motor Manufacturing Company, Detroit, on Jefferson avenue, near the plant of the Hudson Motor Car Company in that city. An accompanying illustration shows the outer shell of the building, as it was nearing completion and gives some idea of its extent. The cost of the structure was approximately 31,000,000, and it is expected to more than double the capacity of the company, which was held to be about 18,000 Continental motors annually.

In style and construction, the new building is similar to those of the Hudson company. Structural steel, reinforced concrete and steel window asshes make the factory as nearly five proof as modern methods of construction will permit. To still further protect the property against danger from five, an automatic sprinkler system has been installed throughout.

The total floor space is 240,000 square feet, the factory covering 12 acres of the plot of 30 which the company purchased recently. The main portion is two stories high and over 500 feet long, and was planned with the idea of securing plenty of light and air on all sides. The interior

The basis of the new product is a gasoline-electric traction system designed by H. H. Ewbank, Jr., which involves the use of separate driving mutor of the traction of the traction of the tractic product of the tractic product of the contine. The officers of the company, which was organized in December, are: Previdence, M. M. Mears; vice president, Gorge W. Stapleton; treasurer, R. S. Howard; secretary, Dr. H. B. Ewbank, Jr. Ewbank, Jr.

MONEY FOR THREE-WHEELED VEHICLE.

The Wagenhais Notor Car Company, which has been comaged in exploiting a three-wheel light delivery can of that name, has secured sufficient capital in Detroit to warrant making plans for procuring a factory site. It is understood that production on a large scale will begin in the near future.

TRUCK FACTORY IN DAVENPORT.

According to a dispatch from Davenport, Ia., the business heretofore conducted under the name of the East Dav-



The Outer Shelt of the Continental Mutor Manufacturing Company's Plant in Detroit, Said to Be the Largest Institution of Its Kind in the World.

is fitted in the very best modern manner, and all machinery employed will be strictly up-to-date.

It is not the intention of the company to abandon its prevent plant at Muskegon, Mich, but the well known track and pleasure rar engines will be produced in both places, and pleasure rar engines will be produced in both places occurred, and it is anticipated that the Continent to be the governing policy of the will continue to be the foundation atoms upon which the success of many motor car and motor track manufacturers are, built.

WENONAH TRUCK FROM MICHIGAN.

A. B. Perkins, his three sons, and G. E. Porter have organized the Wenomah Motor Truck Company, which will be incorporated at Bay City, Mich. Vehicles of 1000 and 1500 pounds capacity will be constructed.

OREGON PRODUCT APPEARS

The first vehicle produced by the Ewhank Power-Transmichion & Motor (Company, Portland, Ore., has made its app-arance in the market, and plans are under way for the servition of a large factory in which trucks, fire apparatus and motor propelled rallivay equipment will be constructed

enport Machine Shop is to be reorganized as a motor truck manufacturing concern. Two trial vehicles are now belink constructed for local firms, and it is anticipated that these will prove sufficiently successful to warrant the production of vehicles of any size and model desired.

LANSDEN SECURES NEW FACTORY.

The Lansden Company, Newark, N. J., maker of Lansden electric trucks, of which Robert Schuttler Hoto of Chicago recently became president, bas removed to a new plant which has been completed for it in that city. The building is No by 300 feet, and is expected to have a capacity of 1200 commercial vehicles a year.

LAUTH-IUERGENS COMPANY EXPANDS.

Plans are being prepared by the Allyn Engineering Company of Ciennant, O, for a one-story brik and steel addition to the plant of the Lauth-Juergens Motor Car Company, Fremont, O, maker of Lauth-Juergens trucks. The building will be 6 th y 200 feet and will provide ample accommodations for the present needs of the rapidly growing business of the concern.

EFFICIENCY IN WHOLESALE GROCERY SERVICE.

An Interesting Example of What May Be Accomplished with Mechanical Transport in Coping with a Situation in Which Horse Drawn Equipment Cannot Be

Utilized Either with Profit or in a Practical Manner.

By C. A. French.

EFFICIENCY may be incapable of being reduced to delars and eents, at least to the extent of piacing the finger upon any one item and devlaring beyond dispute that I: has cost so much money to gain a certain result which is worth so much more money. Undoubtedly it would be possible to arrive at a devision as to whether one method of doing work were more economical than another, if the conditions under which this work were performed were exactly, or even approximately the same. In many lines of business it has been found that a monot truck, for instance.

which it is best adapted is not sufficient to keep it busy all bet time. In such cases it is necessary to provide additionally employment, which might nor might not be undertaken quite as advantageously by horses under ordinary circumstances. By this is meant that while the truck would not necessarily show an ecohomy in the work at which it was placed in order to make use of what might be termed its spare time, its efficiency in the class of service for which it was best adapted would more than offset the difference, and whether or not it effected economy all of the time would prove im-



Allen Sinde & Co.'s Knux Tenek Starting Out from Fall River for New Hedford, After its Plunge Through an Open Caivert.

could be utilized in hauling under identical conditions in which borses had been employed formerly or were still employed. Ender sach circumstances it should prove an easy matter to secure comparative costs, and wherever such have been obtained, the mechanical transport has given shouldn't indication of economy.

Until recently, many business men have been inclined to look upon the matter of economy with too little thought too look upon the little thought occareating efficiency. If a given irrack can do a given work in less time than it would take a horse drawn vehiet to accomplish the same results, that is efficiency. It will indicate that If there be sufficient work to keep the track buys it will replace a certain number of horses, and upon the number of horses it replaces depends the litter of economy. It is not enough to show that a track can do the work of sufficient horses to effect a definite saving. The two terms of efficiency and economy can be combined only when the truck acquainty is doing the work of the horses it can replace.

But the hanlage problem is by no means ac easy of solution. There are times when it is possible to utilize a truck to advantage even when the work does not permit of 11s maximum efficiency. That is to say, the kind of work for material in considering this phase of the situation

It may even be impossible to show definite economy in the work for which it has proved most efficient, for the reason that many commercial vehicles are being utilized in work for which it would be impractical to employ horses. In order to determine whether or not such utilization were economical it would be necessary to take into consideration other features of the business than the haulage problem. For instance, if it could be stated definitely that a certain amount of business was secured and retained through the use of a mechanical transport, the economy would depend upon the proportion of such business and the total cost of obtaining and holding it. Since other items enter into the consideration, and the nature of these is such as to vary with the individual concerns, it is a difficult matter to trace economy under sault circumstances.

However, it will prove of Interest to study an instance of this nature, reference being had to Alfen Sidae & Co. Fall River, Mass., a wholesale grocer employing 14 horses and two motor trucks. One of these latter is a two-to Knox, made by the Knox Automobile Company, Springfield, Mass., which has been in service with this concern nine-July 180.

Allen Slade & Co., has its main offices in Fall River, with a branch establishment in New Bedford, it miles distant. The wharf is at Fall River, about a mile from the main store. Teams are employed in hauling goods from the wharf to the store, and in making dediveries to retail dealers in Fall River and vielnity. Other reams perform similar delivery service in New Bedford, The Knox truck is employed chiefly in transporting goods from Fall River to New Bedford, where it either delivers them to the branch house or to retail dealers as occasion demands. When not thus utilized, it makes deliveries in Fall River and brings goods from the wharf.

It readily will be seen that if it were employed continuously in one line of work or the other, it would be possible to compare its service with that of horse drawn equipment. Under the circumstances, however, this is entirely out of the question, and to quote the transportation manager, William Buffington: "It does not interest us particularly what this truck costs, since it does work it would be impossible to undertake with horses."

To explain this statement, it is necessary to offer a comparison. An attempt was made to serve the New Bedford route with a four-horse team. In order to make the trip at

all, it was found necessary to load the waxon and start from Pall River at 9 in the morning. This outfit delivered the goods at the New Bedford branch and returned to Pall River at 7 in the evening. With the truck it is possible to begin loading at 11 in the morning, visit New Bedford and return at 3:30 in the afternoon.

When Mr. Ruffington uses the word "impossible" it is obvious that he means something more than this explanation would indicate. It must be remembered that a stock of goods is keyt on that a stock of goods is keyt on that when it is necessary for the truck to make delivery thereto, it is because something is needed. There was a time when a retail deader was forred to give an order of goods and walt until the steam ratifical could deliver the freight

Nowada)s, no such delay is tolerated. The wholesaler who cannot deliver the goods when wanted must give way to the concern which can and will. As a result, the retailer orders when he needs the goods, and he expects delivery as soon thereafter an modern nethods will permit.

Therefore, when the retail dealer goes over his stock in the morning and finds he must have certain goods, he called now the working and finds he must have extend goods, he called goods have the wholesale house by telephone. The firm which can retail the force of the afternoon delivery from the retail at one, gets and retains his business, other thinks being the retail at one, gets and retains his business, other thinks being noon for his goods, if may mean the goods to wait until take in the after-to of one of his late, to use the state of one of the set customers, and he will no more wait for of one of his customers and he will no more wait for the customers of the customers of the customers of the sum of the set o

But even if it were "possible" to utilize horses to advantage, it would still be impractical, for the reason that it would not be possible to do the work with four horses. By this is meant it would require the maintenance of reverse animals in order to continue such deliveries. Alles Siade & Co., keeps a reserve of three or four horses, in order to have the actual services of 10 or 11. This is practically a percentage of from 30 to 49, which is by no means excessive.

when it is known that some concerns operating in the larger cities carry a reserve as high as 70 per cent. It would not be difficult to show an economy in the use of the Knox truck if its work were confined to the New Bedford delivery.

There is still another way of looking at the matter. If it were not for the fact that it is possible to make quick delivery over the road with the Knox, it would be nevessary to carry a very much larger stock at the New Bedford branch, while not only would mean a greater amount of capital tied up in goods which might not be needed, but would nevessitate the employment of additional borses in that city. At present there are three teams engaged in handling the deliverles from the New Bedford branch to dealers, and the Knox helps reduce their work by making some deliveries direct. Mr. Buffington estimates it would take at least five teams, were it not possible to utilize the truck in this manner.

The New Bedford trips are not made daily, and it will be seen that the truck is not employed all day long with trips are made. It makes deliveries around Pall River, and hauls freight from the wharf. Something must be add converning this latter work. Here the truck can and does make 20 trips a day between the wharf and the store.



Knox Owned by Allen Sinde & Co., on Parade, Londed with Two Tops of Coffee.

horse waxons make five on an average, and six in an emergrow. It decends somewhat upon the nature of the
freight. Mr. Buffington asps that in enrying barrel susar
the Knox will replace four two-horse teams, with bag susar
there, and with cannet goods two. It some natisfactory
method of quick leading and unloading could be devised,
te thinks he could safely count on doing the work of four
two-horse teams right along. It is significant that no more
horses are being bought by Alien Slade & Co., and that
when new coutpment is needed, motor trucks will be gurchased.

Concerning the track itself. It was designed and delivered as a two-on vehicle. After it had been In service as the design of the months, the company found that two tons was not all the freight it desired to transport with it, and it was dereduced to have the rear axis replaced by three-ton construction. Mr. Buffington says that it has carried three tons on a few occasions only, and that for the most part it has been hauling loads averaging 2.5 tons. The present constructions held to be ample for this work, with plenty of reserve for an emergency.

Most of repairs have been such as applied to what might be termed the wagon portion of the truck. Very little has

been expended on the motor and transmission. Four new springs have been purchased and new brake aboes have heen secured. The vehicle was completely overhauled at the factory of the Knox Automobile Company in the spring of 1910. It was not given a thorough overhaul at any one time in 1911, although pretty nearly the whole machine was gone over by the driver at one time or another. A few weeks ago, during a heavy rain storm, on a return trip from New Bedford, it went through a culvert which had been washed away. When a relief driver was sent out to bring it home, only the rear wheels were visible above the road surface. This gave abundant opportunity for a thorough overhaul, and as may well be imagined several parts had to he replaced with new ones. This hardly can be considered as the fault of the truck, and it must be added that the work of repairs was made in this instance, as has always been true of any necessary adjustments or replacements since it was purchased, under the shed at the store near the loading platform.

The company maintains a small repair shop in the rear of the store. Here the operator does what work is necessary, and such machine work as he requires is done under his supervision at one of the nearly shops. The truck is garaged under the shed, and although this has been an exceedingly hard winter, there never has been any trouble about starting in the morning. Mr. Buffington says the car is in as good condition today as when it left the factory, and better, as far as the work for which it is required is concerned. An accompanying illustration shows it loaded ready for the New Bedford trip. This was taken one day this last month, and shows the machine after its experience in dropping through the open culvert.

Tires have offered a greater problem than any other part of the vehicle. Still, this item does not appear to have sproven at all unsatisfactory. Hartford solid tires were employed until very recently, and the present equipment is the new United States demountable. All tires have been furnished on a quarantee of 8000 miles, and twice this mileage was obtained on the front wheels. The average for the rear wheels has been from 5000 to 5000 miles. The tire maker always has made satisfactory adjustment, and the tire expense figures out at 3.5 cents a mile for the two years and nine months. Fall River has the reputation among tire salesmen of heing exceptionally hard on wheel equipment, much of the parement heing Beigian holes. The experience of Allen Slade & Co. appears to have been quite satisfactory for all concerned.

In the matter of gasoline, no exact record has been kept, except at rare intervals, and then only for a week at a time. It is estimated that the truck travels an average of 20 miles a day. It will be seen that the New Hedford trip would make at ieast 28, not counting any deliveries which may be made to retail stores there. Twenty round trips from the wharf to the store would give 40. Thirty miles appears to be a conservative estimate. Such records as have been kept indicate a milesge of about seven to the railon.

The operator is particular about the oiling system. Once in two or three weeks he draws off all the oil and puts in a new supply. This old lubricant is thrown away, atthough it might be considered possible to strain it and use it again. It is believed that a safe estimate of the oil used is an averuse of a pin a day.

Mr. Buffington has a somewhat unusual method of figuring depreciation. At the end of the first year be wrote of \$1800. The truck cost \$2300. He says he can maintain the vehicle at the remaining \$2000. If he were to consider depreciation he would figure 10 per cent, after that first year. He prefers to figure repairs in lieu of depreciation and expend such a portion of the \$200, which would be 10 per cent, on \$2000, in bringing the car to that fixer. He has no means of knowing whether he expends the whole \$200, although of course he expects the repair bill to exceed that figure this year on account of the accident. Included in the repair and overhaul expense is an annual item of \$35 for painting.

Taking these figures as a basis, it will be possible to obtain a satisfactory estimate of what the truck has cost Alien Sinde & Co., during two years and nine months. Granting that the average daily mileage was 20, counting 300 working days in a year, the total distance covered has been 24,500. At seven miles to the gailon for gasolite, this would give 330 gailons. A pint of oil a day for S5 working days is 108 gailons. Pepreciation is figured Mr. Buffington's way, and interest is based on the original cost of the truck. The table follows:

Sasoline fr It cents a gallon	
oil & 50 cents a gallon	. 53 00
fires & 3.5 cents a mile	857.50
tepreciation, first year	. 1800.00
tepairs in lieu of depreciation	250.00
nterest, 6% on \$2800	627.00
Total	4072.50

This gives an annual expense of about \$1480. It should not be understood that this is anything other than an estimate, based upon the figures as given by Mr. Buffington. While Allen Slade & Co. does not keep an exset record of its horse costs, it is claimed by others in Fall River that it costs about \$5 a week to utilize horses. Evidently, this does not include depreciation or the expense of maintaining wagons and harnesses. In other cities, the size of Fall River, the cost of horse draw equipment fagures out at between \$500 and \$500 a year. The number of animals this Knox track could replace at various lines of work is indicated herein. Those who desire may make their own estimate as to the economy effected.

As was stated earlier in this discussion, the principal point at issue is the matter of efficiency. In this respect, there is much to be said for this Knox truck. Leaving out of consideration the 10 days necessary to put it in condition after the accident in the cutrer, it has lost two days' time since Jan, 1. This is about the average maintained for the year, 1911. In 1910 it was out of service for some time while at the Knox factory for an overhaul, and its greatest loss in this respect was occasioned during the first year of its life. Mr. Buffington holds that the first year is the worst of the lot. After the truck has had opportunity to accustom itself to the work expected of it, he believes there is less liability of damage and less necessity for lost time.

TIME AN IMPORTANT FACTOR.

The Peerless Motor Car Company, of Cleveland, O., maker of Peerless pleasure and commercial lines, is calling attention to the fact that to realize the full efficiency of the motor truck, loading time should be reduced to a milatum. This is seemingly a simple proposition, but too often neglected, many a driver running his vehicle at break-neck speed to the depot of factory, only to waste valuable minutes in loading or unloading when he arrives there. The efficiency of many a truck will be much raised if a stention is given to the methods of loading and unloading with the idea of keeping the car moving as much as possible.

FIRE WAGON FOR BEVERLY.

Beverly, Mass., Is planning to follow the lead of Salem, which recently purchased a motor chemical wagon for \$5.800. Chief Arnold of the Beverly fire department, has haspected the Salem apparatus, and is much pleased the the machine, which has a speed of 50 miles an hour and carries large chemical tanks and considerable equipment.

COMBINATION PASSENGER AND FREIGHT BODY.

BODY design and construction is only just beginning to receive the attention from motor track manufactures which the importance of the subject demands. Many of these concerns will continue to revove thetree will continue to revove the tendence to the production of chassis which shall meet the requirements of the server uses to which they will be just, leaving this matter of body design to others, who have been devotting their force the mechanical conveyance cause into vogue. This applies to all types of vehicles.

Presented herwith is a combination freight and passager body designed and constructed by the Monte Truck Body Body Company, betroit, a concern which is eminently well fitted to take up this probleme, ins members having had extensive experience covering several years. The body is of sufficiently basy construction to permit of carrying a threeton freight load, should the purchaser desire to remove the secan disposed behind the driver and utilize it for that purpose. As shown it will accommodate 32 passengers in a convenient and comptrable manner.

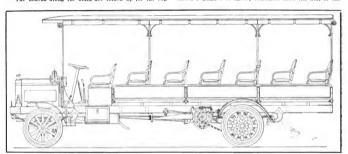
The boards along the sides are folded up for the con-

a freight carrier. Thus, it will be seen that it might be utilized in the morning for conveying the guests to the hoted, and on the next trip to bring their bagsage, while in the afternoon it could be employed in taking tourists to points of interest. After the vacation season is over, it can be transformed permanently into a general utility trick for all, sorts of light and heavy work.

It hardly need be mentioned that the appointments throughout are of the very best material. Nothing in the way of appearance has been sacrificed to meet the demanda of utility. The company has found this type of body to be greatly in demand, not alone hecuage of its exceptional adaptability but hecause of its value as a means of drawing patronage through its excellent provisions for comfort and attractiveness.

NEW McINTYRE AGENCIES.

The W. H. McIntyre Company of Auburn, Ind., has closed a number of agency contracts since the first of the



Combined Passenger and Freight flody Designed to Sent 32 Persons and Constructed by the Motor Truck Body Company, Delreit.

venient loading of passengers, and when in an upright position they make a very good signboard for sight seeing advertising. In addition to these the hinged tail gate is particularly advantageous for the easy loading of freight from the rear and holding it in place when loaded.

To return to the seats. These are of the same order as those employed with the standard street car construction, with regular spring cushions and padded back, making for decided comfort. The front seat is hinged, giving the driver easy access to the gasoline tank.

The top is of light slat and canvas construction, supported by steel standards with suitable brazing, which fit into sorkers on the floor, making for easy removal. Curtains are furnished to enclose the body completely, a special feature which will be more apparent in stormy seather. Cellleid lights of sufficient size to light the interior are provided in each.

The particular advantage of this assembly and one which is expected to make its appeal to those engaged in catering to summer visitors, is found in the fact that it can be converted at once from a passenger or sight seeing 'bus into year. This make of truck will be well represented in all parts of the country, as may be seen by the list which follows:

McIntyre Commercial Car Company, Hartford, Conn.; Mechaiey Auto Company, Stamford, Conn.; Shinkle, Richardson & Co., Huntington, Ind.; Fox Bros., LaCrosse, Wis.; McIntyre Auto Sales Company, Webster, N. Y.; Impertal Motor Car Company, Nashville, Tenn.; C E. Swanson, Chlcago, III.; Syracuse-McIntyre Company, Syracuse, N. Y; Werick Bros. Motor Car Company, Buffalo, N. Y.; George R. Beeson, Connersville, Ind ; Kingman Plow Company, St. Louis, Mo.; Bradley, Merriam & Smith, Connell Bluffs, In.; E Wiley Hill, Rutte, Mont.; McKee & Scott, Fresno and ltakersfield, Cai.; Mcintyre Auto Saies Company, Albany, N. Y.; Standard Motor Truck Company, Roston, Mass; D. F. Head, Ithaca, N. Y.; H. H. Maurer, New Berlin, Penn.; Lovegrove & Co., Philadelphia, Penn.; F. R. Austin, Little Falls, N. Y.; Ranta Rros., Peoria, Hl.; J. J. Aker, Schenectary, N. Y.; Owen M. Smith, South Whitley, Ind.; F. A. Burmeister, Memphis, Tenn.; Hartford City Auto Company, Hartford City, Ind.; J. August Schmidt, Gloversville, N. Y.

NEW YORK'S ANNUAL DEMONSTRATION.

Motor Truck Club's Second Parade Indicates Business Concerns in the Metropolis Have Increased Their Motor Equipment at Least 100 Per Cent.

A DEMONSTRATION which will have a decided practical value in furthering the interest of the commercial weblete industry was held in the second annual parade of the Motor Truck Club in New York City, April 13. Not only were there something over 100 muchines in time, as compared with the 234 of 1911, indicating a sain of at least 100 per cent. in the number of such vehicles utilized by the business interests in the metropolis, but the plans this year contemplated something more than a pageant. Nearly all of the entries were made by owners, and in many instances the cars were loaded with actual deliveries which were made up-town after the parade was distanded at 125th street.

The formation was at Buttery Park, and the parade moved directly up Broadway, save for a short detour wheeled Martin tractors of the Knox Automobile Company. There were three of the G. V. electric cranes, and these attracted much favorable comment throughout the entire journer.

The plan of adopting a one-way route undoubtedly had much to do with bringing out the entries. In other respects it had its special advantages over the scheme of last year, when the trucks nade a circuit of the upper end of the city. Perfect order was maintained at the start and the machines formed an unbroken procession in three divisions, but because of the excessive traffic in the busines section, the parade was more or less scattered at times, a number of gaps showing in the line.

The largest number of cars of any one make in line was the G. V., made by the General Vehicle Company, long



Formation of New York's Second Annual Parade of Commercial Vehicles at Battery Park Ready for the Start,

through 22nd street, Fourth avenue, 27th street, Fifth avenue and 48th street, this beling for the jumpose of visiting the business section of the city, at a time when the demonstration of the city's progress in modern transportation equipment would prove most beneficial to business interests. Preceding the entrants was a Fifth avenue moromibus, on top of which was carried the band, and supplementary trampeters were disposed at intervals throughout the formation.

Herewith is presented the official entry list, from which it will be seen that numerous trucks were in line which appeared at the last moment and were assigned places without their names appearing on the list. By actual count at the reviewing point, Broadway and 100th street, there were 420 vehicles represented, although it is estimated that nearer 500 took part at one time or another. Some idea of the extent of the parade may be gained from the fact that it took 50 minutes for it to pass a given point.

Practically every type of car was represented, from the small electric crame trucks of the General Vehicle Company to the 10-ton Hewitts, made by the international Motor Company, and not forgetting to mention the two threeIsland City, N. Y., with 49, of which but five were entred to by the conjugany Itself. Second place went to the Autocar Sules of Cumpany, Ardmore, Penn., with 66, but in this Instance the Autocar Sales Company was represented by 25. The Instrumental Motor Conjugary, New York City, had no less than national Motor Conjugary, New York City, had no less than inhe Hewlitts. It abould be remembered that these figures are bused upon the official entry list and might possibly need revision, were it possible to secure a full count of those in fine.

Other concerns represented, with the number of care for each, according to this same source of information, were: United States Motor Company, (Alden Sampson Manufacturing Company) New York City, Sampson, 58. General Motors Truck Company, Detroit, G. M. C., 31: Knox Automobile Company, Springfield, Mass, Knox add Martin tractor, 16; American Locomotive Conquany, New York City, Almerican Locomotive Company, New York City, Knickerbocker, 10: Wyxkoff, Church & Partridge, Inc., New York City, Commer, 19; Packard Motor Car Company, Betroit, Packard.

row, nine; Walter Motor Truck Company, New York, Walter, nine; Mals Motor Truck Company, Indianapolis, Mais, eight; Perfess Motor Car Company, Cleveland, O., Peerless, neven; Conplet-Gent Freight-Wheel Company, Grand Rapids, Mirk, Couplet-Gent Fereight-Wheel Company, Grand Rapids, Mirk, Couplet-Gene electric, neven; Gargenau, neven; Chase Motor Truck Company, Syracuse, N. Y., Chase, nix; Mercetes, six; White Company, Cleveland, O., White, five; Universal Motor Truck Company, Detroit, Iniversal, four; Stude-back Corporation, Cleveland, O., Studebucker, two; Pope Manufacturing Company, Hartford, Conn., Poper Hartford, two; Speedwell Motor Car Company, Dayton, O., Speedwell, two; Baker Motor Vehicle Company, Cleveland, O., Blaker electric, two: Dayton Auto Truck Company, Dayton, O., Durable Dayton, two; Locomobile Company of Auericia, Bridgeport, Conn., Locomobile; two.

The following were represented by at least one each: Anderson Electric Car Company, Detroit, Detroit electric; Atterbury Motor Car Company, Buffalo, N. Y., Atterbury;

OFFICIAL ENTRY LIST FOR NEW YORK'S ANNUAL TRUCK PARADE.

CIBST DIVISION

2. W. Austin, Jr., tirone Marsha,
124 Tractive of IT Mahre,
Owner and Maker Trucke,
Irishman Vision Bakery, Aleo,
Nathan Schweltzer, Aleo,
Nathan Schweltzer, Aleo,
Irishman Vision,
Irishman Vision,
John W Hutter, Aleo,
John W Hutter, Aleo,
J. & Klastfer, Aleo,
J. & Klastfer, Aleo,
J. & Klastfer, Aleo,
J. & Klastfer, Aleo,
Alterbary Commercial Truck Up.

Brewing Co.,

Monroe-Eckstein

SECOND DIVISION.

T. A. tapel, Marshal, 116 Tracks of 13 Makes,

 John Meyer, G. V.
 2

 W. B. A. Jurgens, G. V.
 1

 Tiffany Studios, G. V.
 1

 Repettl, G. V.
 1

 General Electric Co., G. V.
 1
 Simpson Crawford Co., Grabowsky G & A. Carbureter Co. Gramm .. Coal Boulet Co., Hewitt ... olumbia Theatrical Trans Co., Knickerbucker Ebling Brewing Co. Knickerb'ker 2 Wm. Farrell & Son, Knickerb'ker t Wm. Farrell & Son, Knickerb' McKiniey Storage Co., Knickerb's Streat Coal Co., Knickerbocker... Wm. Kroepke, Knickerbocker... Armstrong Express Co. Knox. Colwell Lead Co. Knox. Ilcncken & Willenbrock, Knox. Hencken & Willenbrock, Knox.
Ostermoor & Co., Knox.
Phoenly Cheese Co., Knox. M. J. Wolfe, Knox. Brainard Bros. Knox. tor Knox Auto Co., Martin tractor... I France Phineas Jones & Co., Lauth-Juer-Columbia Storage Warehouse, Lanelen Chicago Pacu. Tool Co., Little Lanselen diamet Giant Locomobile Co. Locomobile... Swittehart Tire Co. Mack ... M. Zimmerman Co., Mack..... Mack S. Karpen & Itro., Mack G. Robinson & Sun, Mark International Motor Co., Mark Morgan Bron Mack Morgan Bros Mack . Hariem & Fuiton Market, Mack Sol Cliker, Mack Goodyear Tire Co., Mark

Eberling Brewing Co., Mack... Jos. Dixon Crueible Co., Mack....

C. W. Fletcher, Marshal, 104 Trucks

of 23 Makes,
Stewart Automobile t'o Mais
Daimler Import Co., Mercedes iffreengine:
Laberman Dairy Co., Mercedes

electric, four; Grabowsky Power Wagon Company, Detroit, Grabowsky, Pour; Chicago Henentualt Tool Company, Chicago, Little Glant, four; Lauth-Juergens Motor Car Company, Tenonto, O., Lauth-Juergens, three; Reo Motor Car Company, Iansing, Mich., Reo, three; Packers Motor Truck Company, Meesling, W. V., Packers, three; White Star, Motor & Engine Company, New York City, White Star, three; Robes Motor Company, New Motor Company, New Motor Company, Meesling, W. V.

Francis II. Leggett, Adams Express Co., Packard. John J. Timmons, Packard. John J. Timmons, Packard. Francis II Leggett, Garford. John J. Timmons, Watter. John J. Timmons, Wai Sceman Bros., Packard G Patterson Packard Pritchard, Cackard .. Packers' Motor Truck Co., Pack-Runkel Bros Packers Leonard & Mitchell Bros., Peerless 1 Bottling Co., Peerless. litzon Crucible Co., Pierce .. Recht & Rosenbaum, Pierce-Arrow Muntha & Schmohl, Pierce-Arrow Mergenthaler Linotype Co., Piercewater Co., Arrow ... Chemung Spring Pierce-Arrow Akron Rub. Tire Co. Plymouth .. Pope-Hartford Auto Co., Popeliartford . W J. & S II, Davenport, Pope-Martford Long Island Cons. Car Co., Poss. . I Remington Standard Motor Co., Bemington Renault Freres Selling Branch, James T. Smith, Rec. Reilly Electrotype Co., Sampson ... Politizner Brus., Sampson... Jacob Ruspert, Sampson... Sampson..... Advance Motor Express, Saurer ... S. E. Reynolds, Sampson S J. Kornblum, Sampson . Seeman Bros., Saurer. Wm. P. McDonald Construction Speedwell Motor Truck, Speedwell 2 Waiter James A McCiurg, Walter Waiter Motor Truck Co. Walter . Geo, B Cohena Son, While May Manton Pattern Co., White ... White Star Motor & Linging Co.

Houn. Electric Vehicle Continuts, New York City, Bronz lectric; Holek Motor Commons, Flint, Mich. Butak, Cahillec Motor Car Company, Detroit, Tadillac; Milwanker, Mit-Truck & Manufacturing Company, Missaker, Wic, Champlon; Federal Motor Truck Company, Detroit, Federal, Abendroit & Root Manufacturing Company, Newburgh, N. Y., Frontenac; Garford Company, Elytia, O., Garford; Gramm Motor Truck Company, Lifting, O., Gramm; R-C-H

White Stat.



"Father Katekerbocker" at the Wheel of halekerbocker Track in New York's Parade,

Corporation, Detroit, Hupp-Veats electric: Hydraulic Truck Sales Company, New York City, La France; Lansden Company, Newark, N. J., Lansden electric; Poss Motor Company, Detroit, Poss; Victor Motor Truck Company, Byffalo, N. Y., Victor; Plymouth Motor Truck Company, Plymouth, O., Plymouth; Renlington Standard Motor Car Company, New York City, Renlington; Waverley Company, Indinapolit, Ind., Waverley electric.

The first division was headed by Chief Marshal E. W. Curtis, Jr., and was composed of 124 trucks of 13 different makes. The second was in charge of T. At. Aspet, this comprising 116 vehicles of 13 makes. C. W. Fletcher was marshal of the third division, in which there were 104 of 23 nakes. Besides the chiefs of divisions the following assisted as alies: G. J. Curran, International Motor Conspany; D. D. Robinson, Baker electrics: R. R. Clayton, Studebaker Corporation; H. C. Brown, Sampson, F. B. Kutz, Pletce-Arrow; E. A. Bedell, B. F. Goodrich Company; N. Mallouf, Pecrless; P. J. Dougherry, Detroit electric; F. W.

Dix, Poue-Hartford; C. W. Wurster, Commer; E. O. Hopg, Rarther, Swhichert Tire & Rubber Company; J. M. Young, Chaes; Melvin J. Adams, Alon; J. L. Breese, Jr., Commer; G. E. Anderson, Goodrich tires; A. L. Baringer, Sampson; G. J. Moore, Swinchart tires, and William H. Langford, Remination.

AMERICAN EXPRESS COMPANY'S CARS.

Five years ago the American Express Company, New York City, did not have a sinkle moor truck, taking care of its hading by horse drawn vehicles. About 1600 horses were used, these focing homed in 25 stables. In 19e7, it was derided to try out a number of motors and an electric was placed in service, followed the next year by a gasoline vehicle, and in 1909 by 15 three-ton gas trucks and four electrics. Careful rewords were kept of the two types of cars, and these showed that the gasoline truck was superior for the long hands between the depots and delivery sittings, while the sphere of the electric was found to lie in the shorter delivery routes.

The result of the experiment by the American Express Company was that last year 20 assoline cars and 75 electrics were ordered, making a fleet of 40 gasoline cars and so electrics. In addition to this large moor equipment, about 1300 horses are still retained by the company. The business handled by this equipment can be estimated readily when It is known that the average figures show \$6.000 packages are earried daily.

The company plans to do away with horses to a large extent, and preparations are being made to add 100 michines to the present equipment of 120. The company's hullding on 42nd street is to be remodelled into a modern electric vehicle garage. The second floor will be fitted with charging accommodations for 100 machines, and will be reached by means of floor sixton electric elevators. Of course, the charging will be in the hands of an expert, and one of the features of the system will be an annunciator which will signal when a truck's battery is charged, notifying the nonerator to throw the switch.

The chauffeurs for the motors were taken from the ranks of the horse drivers, who found no dilliculy in handling electric. The gasoline cars, however, were given only to those who displayed some mechanical ability. All there men knew the geography of the city and were familiar with the work, so that no time was lost in making use of the meter esulpment as fast as it was acquired.



A Portion of Jacob Ruppert's Fleet of 72 G, V, Electric Vehicles Taking Part in the Motor Truck Club's Second Annual Parade In New York City.

G. V. ELECTRIC TRUCKS AND WAGONS.

THE possibilities of the electric motor driven vehicle in highway transportation are not often understood. Those considering haulage subjects are inclined to eliminate the electrics simply through lack of knowledge of the service that may be obtained with them. Those who are informed understand that there is a definite use or uses for such transports, and long experience has well established the efficiency of the electric wagon. Those who adopt them do not experiment. There is no uncertainty from any point of view

Perhaps one of the most misleading and erroneous suppositions is that horsepower rating of the electric wagon is comparable with other forms of power generators. That is, that the electric motor has not cauacity or productiveness because it is not rated as are other engines and motors. It might be well to emphasize that the motor of the electric

service wagon is capable of sustaining a 300 DUT CODE OVERload (developing practically four times its rated power) while the average motor or engine will only produce its rating at or very near its maximum production With this fact in mind the electric vehicle appears in an entirely different light

Annther cause for confusion is the asaumption that capacity is measured by the mileage that may be made. The milean-hour speed of the convey-

ance is multiplied by the 10 hours regarded as a working day, and the total appears to be much more than can be made with an electric, when as a matter of fact, the actual daily travel may be not more than 40 miles for a delivery wagon and 30 miles for a truck.

The remainder of the time is given over to loading, unloading, waits, stops in traffic and other delays. Comparing the work actually accomplished, however, it will be found to be practically twice that possible with horses, to say nothing of the increased load capacity of the electric machine.

The electric wagon or truck is particularly adapted for urban service. It has many qualities that are absolutely necessary for economy of transportation. It can be utilized in congested traffic with a certainty that is surprising and it has a flexibility of movement that minimizes wear of working parts and tires. The motor has elasticity the equal of the steam engine and there are no stresses that are destructive of the chamis

The endurance of the electric wagon is surprising. It

is far greater than the animal vehicle and the animal in service. It is the experience that the average horse will serve from three to five years if worked on the paved streets of a city. A first class wagon will endure perhaps five years. The General Vehicle Company, Long Island City, N. Y., after an experience covering a dozen years, makes the positive statement that the machines it huilds can be depreclated at the rate of 10 per cent, a year, an assurance that has a liberal margin. As a matter of fact the first vehicles that this company built are now in daily service in New York City, after nearly 12 years' constant work.

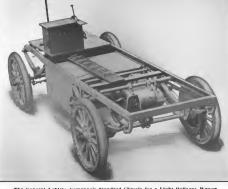
Great Progress Made.

It is certain enough that great progress has been made in vehicle construction during the period mentioned. When it is realized that the first wagons were more or less experimental, and that each succeeding design has been im-

proved. It will be ad mitted that results with the latest types ought to be even more satisfactory and basing expectations on actual knowledge, the turrentage of depreclation may be some-

what lessened

There is no question that this small de preciation is a very potent factor in estimating cost of service. Taking the figure set by the General Vehicle Company as a standard it will he understood that there is a difference of from 10 to 15 per cent. snnually sa com-



The Beneral Vehicle Company's Standard Chassis for a Light Bellivery Wagon,

tured with other types of machines. Assuming that all other conditions were equal this would be sufficient justification for any husiness man to decide that the electric truck was desirable.

There is no stronger argument than this when economy is considered, and yet the cost of maintenance is decidedly small. This of course implies that there will be regular and systematic care. This must be given with animals and other forms of vehicles, and it is assumed that attention witi be uniform.

Simplicity of Operation.

Those who are asked to consider electric machines look upon them as being complicated and mysterious. As a matter of fact there is nothing more simple than this form of chassis, for there is but little aside from the motor, battery, controller, and the frame and wheels. Instead of pursling problems the attention necessary with the motor and the hattery can be given by any intelligent person. It is not essential to have a special training to care for either



The Countershuft Housing and the Assembly, with the Case That Houses the Drive Pinton and Gear and the Murse Stirut Chala.

Mechanical knowledge is not imperative, though desirable, but common sense will amply qualify one to give the needed attention. This statement is not intended to belittle mechanical skill or capacity, but to emphasize how absolutely almple the electric truck or wagon really

It may be well to point out that companies producing power for public service exist in practically all communities of proportions, very often in connection with lighting. The power may be created by steam or water, but it is distributed as electrical energy and is utilized in motors. In the best equipped shops and works it is the custont, because of the undoubted economy, to have individual motors for each machine. The value of such installations has been established beyond questions.

No business man will maintain that the electric motor is not dependable. Hundreds of thousands of them are in use each day, from the tiny equipment that will operate a sewing matchie to the motor that energizes an entire plant. These motors are operated day after day and month after month, with surprisingly little attention. Clevaliness and sufficient lubrication are the two essentials. There is a very small loss of efficiency through war. There is no other type of energizer that will show so sificht a loss of power, and the electric motor has the quality of delivering his capacity instantly and for as long a period as is nevessary.

The manufacturer who has modern power equipment for his mill, shop or works will indorse the electric motor. He will accept a statement for its efficiency as final, because he knows from experience.

Practical Service at Minimum Expense.

Turning to the vehicle itself it is best to deal with facts that cannot be controverted. There is no better au-

thority in America, perhaps not in the world, than the General Vehicle Company, which has produced machines for more than 11 years -since it was established Jan. 1, 1901. It is well to state that no other types have ever been built and as the company was created as a business enterprise, by men accustomed to large undertakings and desirous of attaining a large measure of success, nothing was sacrificed to sentiment. The wagons were first of all designed with the object of seenring extreme endurance. Capacity was an equally potent factor, and this included load carrying and speed and mileage. But with these the matter of economy

economic aspect of the electric nas been studied to obtain the largest practical service at the millimum expense.

It is an undisputed fact that during the past decade remarkable progress has been made in the perfection of the electric motion. The very general mas of electricity for lighting and power has reduced the cost of energy from 66 to 25 per cent. With the improvement of the motor and the reduction in price of current it is not unreasonable to assume that the actual cost of driving an electric vehicle a mile today is about

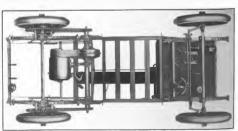
80 per cent, less than it was 10 years ago. Thus it will be seen that the present economy of the electric is due to two entirely different influences, which, while in every way separate, are thoroughly in harmony.

It is not too much to expect that there will be equal inprovement of the machines and a still further reduction of the price of current. The increase of battery capacity is another equally certain result. But what has been and be be stated relative to the electric wagon is not based on specilation. It is merely a rectila of facts of record.

The General Vehicle Company is a pioneer in the electric vehicle industry. Less than 100 euromers only now wagons and trucks it has built. Twenty customers on an average of 30.5 vehicles each, or a total of 512. One industry alone has invested more than \$1,000,000 in its machines. It is pointed out that of the 1911 business of the cumpany 69 per eent, was in the form of reorders from customers operating vehicles made by it, a remarkable connectary on the character of the service obtained and the nature of the attention given to the patrons.

Design and Construction.

Obviously the substaction obtaining with an electric vehicle in service is dependent upon the design and construction, and the three factors are simplicity, accessibility and standardization. Without standardization the vehicles must be built to specification, a class of production that 8 necessarily more expensive and entails the maintenance of more or less factory equipment of uncertain productiveness. Standardization insures minimized cost, equality of workmanship, milrorinity of materials and a continuation of design. The General Vehicle Company produces six types, the camericles being 7.50 and 1000 pounds, on, two, 3.5 and



was carefully considered. The view of Standard Chassis as Seen from Below, Hustrating the Simplicity of Construction.



The beneral Vehicle Standard Motor with the Shell Opened Expening the Commutator,

five tons, respectively. These are designed to meet the requirements of practically any delivery or haulage service.

The General Vehicle Company's transports are extreme by simple in design. They are, so far as the motor and controller are concerned, practically adaptations of the street are equipment, the only difference belief that the street are is driven on the rails and the waxon is driven on the road, and that the energy of the latter is taken from a stored battery instead of from the charged wires. There is nothing complex or mysterious in this - The endormore of

the street car motor is known of all persons, no matter whether they possess electrical or mechanical knowledge. With the street car equipment there is the possibility of the motor being "burned" by a short circuit because of the heavy voltage with which the feed wires are charged. but such happenings are rare considering the number of motors in use. With the motor used in the vehicle, however, there is no such probability because there is a limit to the capacity of the battery, and the motor is constructed expressly to resist an overload of Son per cent, with entire safety. The motor cannot be damaged The battery can be charged as often as is necessary, which is usually once the night of each working day. Charged and discharged with regularity the life of a battery is very long. As to the other working parts of the chassis there is nothing that will wear anduly. The components are

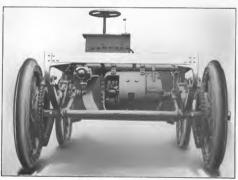
not subjected to severe stresses and because of that fact have lengthy endurance.

Power Plant

The motor or power plant of the electric vehicle is a standardized product of the General Electric Company, the largest maker of motors in the world. It is made to endure and it is given absolute protection by a cast steel shell or case. In this case at either end is mounted the imported annular ball bearing in which the armature shaft is installed, this minimizing the friction losses and insuring a high efficiency. The field pole pieces are a laminated from construction. The field and armature colis are perfectly insuisted and are made water proof. The armature shaft is tapered and the driving pinion is attached to it by a lock washer and nut. The commutator segments are of proportions that insure sufficient commutation with all loads and long life of all the parts. The brush holders are simple and enduring and graphite brushes are used, these being strong and yet offering little resistance to the current. A section of the motor case is mounted on hinges and it may be so rightly closed as to resist dust, water and oil, yet in a few seconds the interior of the case and the motor may be reached for examination or attention.

The motor is suspended from a large tubular cross member that is fitted to the chassis frame and it is given rigidity by a tubular member that corresponds to a torsion tube extending from the motor shell to the lackshaft housing. This may be noted in the hottom view of the chassis.

The factshaft is mounted in self-aligning ball aleves in heavy brackess fitted to the bottom of the chasis frame, the construction being such that the entire counterplant may be protected from stresses should there be distortion of the frame. The countershaft may be handled as a unit Within the housing are the two short driving shafts connected with a differential of the spur year type, these being mounted on four long redier bearings. The outer end of each shaft carries a sprocket. The drive is from the motor pinion to the differential gene by a Morse shein chain. This chain is enclosed in a water and dast proof housing and there is a larse inspection hole at the side. The chain is driven in a bath of oil. The first reduction is by the drive from the motor to the construction of the second is from



Rear of Standard Chassis, Showing the Manner of Installing the Mojor and its Extreme



The Front Axle of the General Vehicle Chassia, of Sturdy Construction, and the Roller Bearing Spindle Equipment.

the countershaft by roller chains and sprockets on the rear wheels

This is practically all the mechanism of the vehicle, aside from the wheels, steering connection, springs and brakes, so it will be seen there is construction of the simplest form.

Chassis Frame.

The chassis frame is of channel section pressed ated well braced with cross members. There is no difference with any type save in proportions, each being caucity silke. All connections of members are heaced with vanadium steel brackets, all hot riveted. The lice countershaft brackets and the spring hangers are of vanadium steel, carefully heat treated. The frame carries the motor and countershaft, as has been described and from it, forward of the countershaft, is carried the battery. This is installed in an iron box sheathed with wood to protect the metal from causes for deterioration. The weight is very low and the centre of gravity is correspondingly lessened, a very desirable quality with any vehicle.

The frame is suspended on half-elliptic springs, oil tempered, that are as little curred as is practical and obtain sufficient clearance, the reduction of the curve minimizing the friction between the leaves. The care springs are slackled at both ends, this affording the greatest degree of action without stress, the driving strain being taken by radius rods that extend from the deal rear asle to the countershaft housing, being fittle close to frame. The spring clipps are heavy and the shackles and bolts are of a specially fine grade of mucie.

The axlea are of 40-carbon, open hearth steel, the forward axies being I section and the rear after tubular, of
ample proportions. The wheels are all mounted on Timken
roller bearings, which are packed with grease and require
but little attention other than to renew the lubricant as
occasion demands. The steering gear is a pitalon and sector
type, built by the company, the attention being fixed
to the chassis and the connections being made with universal joints. All wearing parts are hushed with steel and
may be replaced as worn. Ample provision is made for
justicating all the moving members where they contact.

The wheels are an artillery type, fitted with solid rub-

ber tires, dual membera being used on the rear wheel of the larger and heavier trucks. The brakes are within drams carried on the rear wheels. They are of the internal expanding form and are operated by a pedal at the base of the steering post through a long rod connected with an equalizer and thence by linkages to the toggle levers that actuare

the leather-faced brake shoes. The linkage is so compounded that a comparatively easy pressure will cause the wheels to lock. The means for adjustment of the brakes are in every way sufficient.

Battery Equipment.

The storage battery used has been standardized. It is always composed of 44 cells, ranging from nine medium to 21 medium plates to a cell, contained in from four to six crates. The capacities range from 112 to 280 ampere-hours.

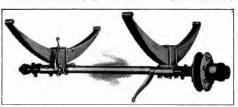


The Controller by Which the Movement and the Speed of the Chanda Are Governed,

The battery cradies are deep enough to permit the use of high bridged jars, with two bridges early 2.75 inches high. The same size of wood and rubber separator is used between the plates in all batteries and the electrolyte has the same density. The rubber jars of differing sizes have the same thickness of wall, and the elements fit exactly all jars, making for complete interchangeability.

The motors are rated by number and are standard with voltage of 8.5, but the amperage varies from 16 with the 750-pound wagon to 40 with the 3.3 and five-ton tracks. The 750-pound wagon motor is rated at 1600 revolutions and the 1000-pound wagon motor at 2000, but the others are uniform at 1200. The figures are for the lead or acid batteries, and do not apply with the Edison or aikall battery.

The controller is the continuous torque type built by the General Electric Company and it is exactly the same as those used in



The Henr Axle and Springs, Showing the Roller Bearing, Wheel Huh Finnge and the Levers for the Internat Expanding Brake.

street railway practise, save that it has the axis of the rotable insulated semi-cylinder parallel to the horizon instead of vertical, as with the street car installations.

On the circumference of the semi-ylinder is a number of copier contact block arranged to make the desired connection with the copper flagers of the controller, which are connected with the terminals of the battery, resistance and the motor. This controller is placed beneath the driver's seat and it is actuated by a lever that is at the site of the operator. There are four forward speeds and two reverse, and the method of operation is simply quashing the lever in the direction one wishes to move. The motor speeds are changed by degrees and there is no shock or sudden engagement of the motor. The wiring systems between the controller and battery, the battery and motor, and the motor and controller are substantial cable, thoroughly insulated so as to be protected against water, oil, mnd and

acid. The cable is firmly secured to a wooden member and cannot be shaken loose or affected by the vibration of the chassis.

It will be seen that there is nothing that will produce complications in the electric vehible classis. The conjugate is so simple as to be surprising to those who begin to drive them. There is a steering wheel, a single pedal that operates the brake, and the controller handle that controls the motor. There are no gears to shift, and no other pedates to push, or hand levers to move. The condition of the battery is indicated by an ammeter, or a sangometer. When the driver leaves the vehicle he turns a switch and machine cannot be started until the connection is again made.

The electric vehicle is the acme of simplicity. It is clean, it is suited for any form of haulage, and it has every quality in service that could be desired to the limitations stated.

SPEEDWELL REPLACING MULE WAGONS IN CALIFORNIA.

What is believed to be one of the largest haulage problems to be undertaken by mechatical transports, and one involving approximately 260,000 ton-miles, is being solved by a fleet of six Speedwell trucks of six-ton capacity. Before accepting the order for the trucks, R. Harry Croninger, manager of the truck department of the Speedwell Motor Car Company, and L. V. Lynch, went over the ground very carefully, for the character of the roads and



made by the Speedwell Motor Car Company, Dayton, t., the contract having been closed by L. V. Lynch, who is the company's distributor for northern California.

The machines will be utilized to transport tonnace consisting largely of cement and himber, in addition to the commissary supplies for the army of men engaged in the construction of the lunes storage dam of the threat Western Power Company at Big Meadows, Plumas county, California All supplies, etc., will be haulted from Keddie, a distance of 26 miles and over narrow mountain roads abounding with treacherous curies and steep grades. Previously, this work was performed by six and eight mult teams, those averaging a round trip in three days, because of the roads.

Some idea of the amount of material to be bauled may be gained from the announcement that the reservoir made by the dam will be the largest artificial body of water in the country and it is estimated that over 1,000,000 feet of lumber will be required, to say nothing of tons of cement. country presented an application different from the ordinary commercial work. In man sections the roads were found to be too narrow to permit of two machines passing and this added to the completations. After studying the attuation with the engineers of the tireat Western Power Company, the Dayton concern stated that its product rould handie the work successfully and economically.

It is proposed to run the trucks in fleets on scheduled time as with seam trains, and teach the other users of the highways the time when the cars will be at passable points. Each power wagon will be equitiped with a passable full electric signal which can be heard three miles and it is believed that the signals will be understout greatily.

It is estimated that the saving to the highways by the substitution of motor cars over the mude engineers with the considerable. With the latter was employed a wagon having three-clinch steel tires, which materially affected her road, but with the trucks this same tonnage or pressure is carried on a surface of 12 inches of rubbase.

THE A B C OF MOTOR TRUCK OPERATION.

A Simple Exposition of the Principles Underlying Operation, Maintenance and Repair of All
Motor Driven Commercial Cars, Describing Details of Their Components.

Part XVIII—How Power Is Transmitted to the Rear Wheels.

By C. P. Shattuck,

HAVING explained how energy is developed and outlined the function of the clutch and transmission, the next logical step is the method utilized for transmission, the next logical step is the method utilized for transmission, the second of the motor to the driving or road wheels. The final drive is an important factor in motor car construction and may be stated to comprise two systems, one employing and the properties of the control of the components of the chassis varies; that increasal joints and beach specified and the components of the chassis varies; that is, the power plant may be located in front under the bood and energy transmitted by means of a shaft to the transmission and thence through another shaft to the driving axles, or the motor may be located antibolity and the countershaft driven

members, one on either side of the differential and one under each spiring. Energy from the motor is transmitted through the medium of a small sprocket attached to an actension of the crankshaft, and thence by a chain to the larger sprocket on the rear axle. The former is not rectated at the crankshaft spired, the ratio being approximately 3.5 to one; that is, the smaller sprocket makes 3.5 revolutions to one of the large member. For example: The small sprocket may have 12 teeth and the larger 42. Any number of ratios may be obtained by employing different sized sprockets on the driving shaft on which is carried the planetary transmission. This type of drive is utilized on light delivery cars, and of the design it may be said that power is transmitted to the rear wheels with a minimum loss.

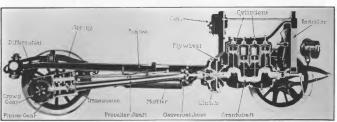


Fig. 74-Chasels of Pleasure Vehicle Bisected to Deplet 1 (Blastion of Shaft Brive and Live Vale.

by a single chain and final drive by double members. Although variations exist the basic principle is the same, the designer seeking to obtain the maximum efficiency in the method of drive.

Types of Chain Drive.

The chain drive may be sub-divided or classified under two heads; namely, the single chain and live axle, and the double chain and solld or dead axle. Upon cars employing the single chain and live axie, so-called because the road wheels revolve and rotate with it, the latter is usually a cylindrical shaft of steel divided into two parts, to each end of which is attached one of the road members. Between these axles are located the differential or compensating gears which perform the same function as the fifth wheel of a horse drawn vehicle, that of permitting the machine to turn corners. The driving axies are enclosed in a steel tubing made in two sections, and provision is made for the differential and sprocket as well as for securing the axle housing. The latter is sturdly constructed to withstand stresses and so arranged that it may be disassembled for repairs or adjustments.

The axle tubing has supports or spring pads upon which rest and are boited the springs, and the housing also extries the bearings upon which the axlea revolve. These may be of the ball or roller type and usually consist of four The double or side chain drive is generally employed on mechanical transports of large tonnage, and when this form is utilized the rear axie is of the solid or stationary type, and is similar to the axie of the horse drawn vehicle, insummeh as the wheels revolve on ball or roller bearings, floited to the inside of the spokes of each wheel is a large sprocket and upon the frame of the ear is mounted a cross shaft known as a counter or Jackshaft. This carries at each end one of the saulier sporkets, from which the p-wee is transmitted by chain to the sprocket located on the rear

Fig. 78 outlines clearly the solid type of rear axie and the large sprocket on the road wheel and the namer of attachment. It will be noted that the axie is substantially constructed and attached to it are the springs, these in torn being secured to the main frame by shackles. In the illustration the wheel is shown removed to expose the end of the axie which is equipped with roller bearings, and the driving sprocket and chain is also outlined. The assembled components are also depicted, and it is obvious that some arrangement is essential to permit the vehicle to turn corners.

Location of Countershaft,

Reference has been made to the countershaft and this member is outlined at Fig. 75. It will be noted that it is

constructed in two parts or divided near its central portica. which is enlarged to permit of the installation of the compensating gears. In this design power is tratismitted from

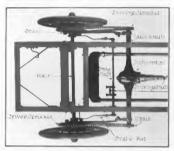


Fig. 75-ibilliolog Application of Double Chain Drive and Loentlon of Counteenhati

the last year of the transmission, thence through a shaft to another gear or pinlon which rotates the crown gear and subsequently the jackshaft. The latter revolves in ball or roller bearings and its design varies, although the principle involved is similar. To prevent the binding of the countershaft through possible distortion of the frame, a flexible joint is usually provided and in some designs two are employed. Provision is made for lubrication in the form of grease cups or oil holes.

As previously explained, the location of the transmission and differential varies. In some designs these components are a unit as at Fig. 76, which outlines the differential member, also the driven countershaft. This arrangement makes for compactness and strength and the components are protected from dust and mud. Energy from the motor is transmitted through a shaft having universal loints, thence through the mainshaft of the transmission to

the driving bevel. The latter rotates the grown gear which in turn imparts motion to the countershaft on which is fitted the sprockets actuating the chalus to the sprockets fitted to the road when la

Advantages of Chain Brive,

The double chain drive preso ats many advantages, trasmuch as the axle which carries the load ts a solld plece, and being stationary is suitable for supporting henvy loads. The differential mechanism upon its divided shaft is entirely relieved of any weight or shock resisting functions, and may be completely enclosed and operate in oil. For very heavy trucks the double chain drive is the chains are enclosed to protect them from dust and mud, the drive is very efficient as loss by friction is reduced to a minimum.

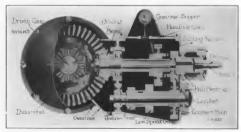
As there is a strong forward pull transmitted to the

rear axle by the chains when power is applied, it is obvious that some method of counteracting this force must be incorporated to prevent the axle from moving forward relatively to the rest of the vehicle. Two distance or radius rods are provided for this purpose and consist of tubes or solid members, the rear ends of which are attached to the axle and the forward portions secured to the frame of the machine, at points not far out of line with the front sprocket. These ruds are made adjustable, and by loosening or tightening, the driving chain may be adjusted correspondingly, thus securing perfect alignment of the road wheels. Figs. 78 and 72 outline these distance rods and the manner of attachment

The principle of the shaft drive is similar to that of the chain with live axle, the difference being in the method of transmitting the energy of the motor to the rear or driving axies. Instead of a sprocket wheel being fitted to the differential mechanism, a bevel gear is employed, although a variation is noted in the worm drive, described and illustrated herein.

The principle of the shaft drive is outlined at Fig. 74 which presents the chassis of a pleasure vehicle bisected squarely in the middle from top to bottom. It will be noted that power is transmitted through the clutch, thence through a universal joint and shaft to the transmission. A shaft of the latter is fitted with a bevel gear carrying teeth, the faces of which are cut in lines parallel to the direction of the shaft, upon which it is secured. Mounted with the differential is a larger gear or crown member with which the smaller pinion is in mesh. This arrangement is necessary when it is desired to connect by means of gears two shafts at right augles to each other; that is, the faces of the gear teeth are at an angle or bevel with the shafts upon which they pregrate, the sum of the angles of the tooth faces with their respective shafts being equal to the angle between the two shafts. The ratio of these gears is obtained by dividing the number of teeth on the larger member by the smaller idnion as with the chain drive

Because of the slight variation in the distance from the pidnt of attachment of the drive shaft to the sneed changing mechanism, the point of contact of the two bevel gears changes slightly on account of the relative movement of the axle and car, and the shaft is provided with flexible joints. These members also serve to compensate the line of drive, and the amount of wear desends muon the drop; that



indersed by engineers, and when Fig. 76-Depicting the Differential and Transmission as a last, the the countershaft and

is, how far below the level of the crankshaft is fitted the bevel or driving gear

When power is applied the tendency of the smaller gear

is to force the drive shaft forward and to push that portion of the differential to which the larger gear is attached away from itself. To prevent this lost motion, thrust bearings

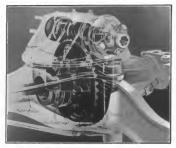


Fig. 77-The Worm Genr Brive, Having the Advantage of High Reduction with Small Sizes and Making for Quiet Running.

are fitted and these generally take the form of rows of steel balls, bearing upon hardened surfaces in such directions as to take care of the thrust. Bail or roller bearings are nillized to support the driving shaft which rotates in a hollow tube and provision also is made for the lubrication of the working parts. Radius or torsion members are fitted as with the chain drive system

Various types of rear axies are utilized with the shaft drive and among these is what is known as the full floating type in which design the differential bearings are mounted on the hub of the differential instead of directly upon the shaft. The outer ends of the axle housing are so constructed as to permit of the mounting of bearings of sufficlent capacity to support the weight of the vehicle through the medium of the driving wheels. This arrangement permits of the withdrawnl of the axies or driving shafts with-

out removing the wheels or jacking up the rear system. The road wheels are actuated by jaw clutches; that is, the outer end of each shaft is provided with jaws which mesh with recesses in the hubs of the road wheels. This design makes for easy inspection of the components and disassembling as well. There are other forms of floating types such as seml and three-quarter, also rear axles having bearings similar to that of the single chain drive with live axle previously referred to. With these types the wheel is secured to the driving axie which in turn is supported by bearings contained in the housing.

Worm Drive differs from those of usual con-

struction is the worm which is depicted at Fig. 77. This design is favored abroad and was juto contact with some revolving part of its mechanism adopted and successfully applied in this country, by a prom- which is in motion at all times that the vehicle is running inent maker of pleasure vehicles, to a commercial car.

The worm and gear has been utilized for many years in the steering system of antomobiles and was supposed to be absolutely irreversible, a desirable feature when thus employed. The worm and gear, however, is constructed so as to be reversible and when substituted for bevel gears in a shaft drive with a live axle, has the advantages of high reduction with very small sizes. straight line drive, and the elimination of friction losses through universal joints. In addition, it has a reputation for quiet running. With the mechanical transport a greater reduction from engine speed is more desirable than with the pleasure vehicle, and the ratio of the gears in the illustration is approximately about eight to one. It will be noted that this design includes a torque rod for taking driving and braking strains, while the usual radius rods are fitted to relieve the springs of all tractive effect.

Internat Gear Drive.

Another form of drive and rear construction which may be said to embody the advantages of the solid rear axic utilized with the double chain, yet employs a differential and shaft as with the live axle, is the internal gear drive outlined at Fig. 79 A. It will be noted that the rear axie supporting the load is of the solid type and is turned down at the ends to form the wheel spindles to which are fitted roller bearings. Just inside of each spindle is a spider shaped casting which is utilized to support the differential axle, form the spring seats and provide a hub in which the radius rod is inserted.

The driving mechanism is depicted at B, this consisting of a housing carrying the differential and driving shafts and its operation is similar to the countershaft of the double chain drive with the exception that a spur pinion is fitted to either end instead of a sprocket. Each of these pinions meshes with a large internal gear boiled to the inside of the road wheels and the entire mechanism is enclosed and operates in grease, being dust and weather proof. The two radius rods unite toward the middle of the car in a single ball joint, which arrangement takes care of all stresses when operating over rough roads.

Function of the Brake.

With any mechanical conveyance it is essential that some means be provided for bringing the moving vehicle to a stop, and with the motor car this is accomplished by friction through stationary bands or shoes being brought



Fig. 78-Conventional Type of Solid Axle Lillised with Double Chain Drive, with Wheel Bemoved to Show Driven Sprocket. Tyle and Brake

Brakes are classified according to their construction as con-

tracting hand members or those of the internal expanding type, and they may act as hub, differential or transmission brakes

The band brake consists of a strip of thin metal lined brake consists of a strip of thin metal lined with frictional material and so arranged that its ends may be drawn together by nieans of a powerful togethe arrangement. This binding strap entireles as nietal drawn or pulley, attached to some part of the mechanism which moves when the art is in motion. When the band its contracted through the art is for motion. One of the straight of the st

The internal expanding brake, a form of which is depleted at Fig. 78, is favored because of its double acting qualities and the less liability to drag upon its drum. It consists of two semi-circular metal shoes, which conform to the inide surface of the wheel drum and are fitted with springs to prevent them from coming in contact with the drum when not in service. The

members may be expanded by either a cam or toggie arrangement and when properly adjusted so as to provide an equal frictional effect are very dependable.

In order that an equal pressure may be exerted to both brakes a device known as an equalizer is incorporated, this member tending to divide the braking effect equally between the two wheels. Two sets of brakes are usually provided, one being the service member operated by pedal and an emergency actuated by a hand lever. These may be fitted with a locking device by which the brake may be held at any desired degree of pressure. The emergency brake may also include means for throwing out the cluss h when the member is operated. With the commercial vehicle, transporting as it does, bears louds it is imperative that the brakes be well designed and substantially constructed. width is such that many square inches of braking surface are obtained, and provision is also made tor taking up wear. Efficient

springs which hold the bands in a

normal position until pressure is applied, also preventing
unite friction as well as wearing out the fining.

(To Be Continued.)

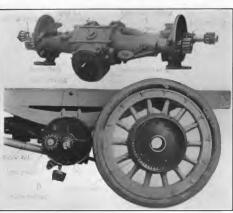
Ed. Note-The next Installment will deal with the function of the differential and the steering systems utilized.

NEW ENGLAND PURCHASES INCREASING

The purchases of notor trucks in the New England States have increased rapidly in the past year and a half, according to William P. Kennedy in an address before the Electric Lunderon Club, hoston, recently, Mr. Kennedy Eave some exceedingly interesting statistics. The trucks placed in service during benchmark of Sept. 1, 1911, reached a value of \$10,000,000, of which 30 per cent, had been placed in service during the preceding 12 months. The pleasure car total is three times this, or \$30,000,000. According to Mr. Kennedy, the business of the six months from December list to March indicates that last year's record is to be exceeded by Zo per cent., and that there will be in operation in New England by Sept. 1, 1912, some \$60,000,000 worth of vehicles.

DAILY ROAD PATROL.

In these days when motor transportation between cities is more dependent upon the roads than upon the tracks, any new road improvement scheme should prove of devided interest. The Middlese: Automobile Club of New Brunsweige, N. J., has proposed a systematic daily examination of the highway in its vicinity. The idea is to establish a road patrol which shall no over every nitle of the highway every day and correct at once minor faults before they grow larger. The club has appointed a committee to confer with the Board of Perebolders, and it is hoped that the two



members are equipped with Fig. 76-Illustrating the Internal Lore Drive, Combining the Advantages of the Solid and surings which hold the bands in a Live Avies, the Former Carrying the Lond.

bodies will be able to co-operate in parrolling the roads. The expense will no doubt be large, but it should be remobered that there will be considerable saving in repair work, as for the patrol will be able to work on bad spot as so no they appear, before they grow so large as to necessitate extensive requires.

ADVERTISING BY MAIS TRUCK.

A Mais, made by the Mais Motor Truck Company, Indianapolls, its to be need in an advertising science, and will go over the Fremier occanitosecon route from indianapolls westward. High Annis will be in charge of the expedition, and five men will constitute the crew. The truck will carry wireless apparatus, telegraph and telephone sets, a type-criter, and camping could.

MOTIVE POWER FOR THE AVERAGE FARMER.

Solving the Problem of Furnishing a Satisfactory Vehicle That Not Only Will Do the the Ordinary Field Work, but Carry Loads on Its Own Body--Success That Has Accompanied the Use of the Avery Farm Trucks.

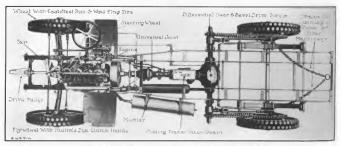
AN the average farmer, the man with 500 or 600 acres of land, utilize a gasoline truck to advantage in undertaking his general field work? That the larger tractors have been accomplishing splendid results on the farms containing thousands of acres on the broad prairies of the West and In Canada, is more or less well known, but there appears to be a lack of information concerning the vehicle which is adapted for similar usefulness on the so-called small farm. Undonbtedly, there are numerous questions which must be given careful consideration before the horse is entirely ahandoned, but at least one manufacturer, the Avery Company, Peorla, Ill., claims to have reached a decidedly satisfactory solution to all these problems in its Avery farm truck

The argument against the horse may be summed up as

many bushels as must be raised to the acre.

Little need be said respecting the liability to accidents and disease, or the effect of weather conditions upon horses. In the matter of care and attention: At night, it is unhitch, unharness, water, feed and bed a lot of fired, sweaty horses. In the morning, it is feed, water, curry, harness up and hitch up. At noon, it is unhitch, water, feed and hitch up. Even when they are not at work, they must have care in order that they may be in condition when needed And they must have the same care on Sundays and bolidays

More might be said concerning the drudgery of farm work, but the use of modern farm implements already has eliminated some of this. The present generation has seen the passing of the plodding oven dragging the single plowshare across the field, while the farmer hit the book a



Chassis of Avery Parm Track with Principal Paris Daillord to Indiente Their Position and Reintion to Each Other,

follows: It costs too much to feed, it takes too many men to operate, it takes too long to do the work, it is subject to weather conditions, diseases and accidents, and it takes un too much time in care and attention.

It is maintained that it takes the crop from one acre in five to feed the horses necessary to do the work. The Minnesota Agricultural Experiment Station has discovered that the average annual cost of maintaining the average farm work horse is \$80, and for this cost, the animal gives a return in work averaging about three hours a day throughout the year, at a cost of about eight couts an hour on the average Minnesota farm,

One man can handle from two to four horses and do it right. It is becoming more and more difficult each year to hire good help, and each year the wages are increasing.

In order to make good profit from farming these days it is necessary to use up-to-date farming methods, which means that the farmer must plow quickly and to the required depth when the ground is in just the right condition, and that it must be cuitlyated several times over in order to make the best possible seed bed and to hold the moisture. It is an impossibility to go over the ground enough times and quickly enough with horses to raise as kick with his cowhide boot in order to turn it over a: the end of the furrow. For a time the horse succeeded the ox in this work, but nowadays the farmer sits on a wheel plow and turns the shares with a lever. The introduction of the gasoline truck appears to be but another step in the offward march of progress.

The Avery Farm Truck.

The Avery farm truck is claimed to be the only machine designed and built for farm work, which will had loads on its own body. It is the result of long experimentation, with the object in view of creating a power machine which will enable the farmer to do his work at less expense, at the right time, in the right way, and in a manner to relieve him of the troubles and faults of horse power. The method of meeting the various problems involved will appear with a description of the vehicle and citation of some of the work already accomplished by these machines in actual service.

For such work as is contemplated by a vehicle of this nature, it not only is essential that the motor shall deliver its power under unusual conditions when plowing and hauling, but it is particularly desirable that it shall operate at its maximum efficiency under load without heating while



Avery Motor, Designed in Present Exceptional Cooling Faellities,

working as a stationary engine in sawing wood, threshing, etc. In this respect the designer of the Avery farm truck has lost no opportunity to provide for every possibility. Particular attention has been paid to the matter of cooling.

In the first place, the motor employed is a four-cylinder, four-cycle, water-cooled winj of the vertical type, placed forward under a hood and easily accessible. The hore is 4.75 inches and the stroke five, giving a horspower of 3. under a brake test. However, the machine is rated at 12 increpower in tractive effort for pulling bads, and it is held to be possible to obtain any speed from two to 15 miles an hour.

Provisions for Cooling.

The cylinders are of the L head type cast securately and with their entire surface exposed, permitting equal expansion and contraction of the metal on all sides. Liberal water Jacketa have been supplied, and petrocks are provided at the lowest points, as also is true of the radiator and pump, so that all of the water may be drained from the entire system, should it be found desirable to put the truck up for the night without resorting to the use of an antifrecting solution before cold warther actually healins.

An additional feature in the vilinder conformation is the utilization of four radiating fins helow the water jacketing on such how the water jacketing on such piemental cooling somewhan on the principle of the alresouled motor. Thus, not only is the comlossion chain the throughly cooled by water but that portion of the cylinder below also is maintained at a proper temperature by these radiating lines.

It is claimed by the company that its coulding system will keep the motor cool even when the track is being used in the severest work. This comprises a ioney-comb radiator of large caparity, placed in an upright position in front of the motor, and a fan just behind this. A positive sear pump keeps the water in circulation, even when the enficulation, even when the enfiis running at a low rate of speed. Nine gallons of water are thus forced through the manifold, entering the cylinders are thus forced through the manifold, entering the cylinders near the valves, so that the coolest water strikes the hottest spart of the cylinders first. In connection with this, the side is driven by a one-included the true of the coolest water strikes are not set of the coolest water strikes as the hottest spart of the cylinders first. In connection with this, the coolest water strikes by a one-included that the coolest water spart of th

Meter Construction.

Inasmuch as the moving parts of the power plant are subjected to streams not usually encountered even with commercial vehicles, special effort has been made to insure that these shall be retained in perfect alignment at all times. The erankshaft, for instance, is a drop forgling, accurately surned and trued, and fitted with six hearings, the object behins to hold it in position under the most severe atrains. The same thing applies to the cambalat, also a drop forging with invegral cams. After forging, this is machined and hardened, then reground to prevent the possibility of neshes a shaft which might have been drawn out of alignment during the hardening process. The connecting rods are steel forging, each having larse bearings at both redis-

All valves are accurately ground and are of the adjustable type, this lening accomplished by a lock nut arrangement. The motor is fitted with so-called clean-out plugs at the top of each cylinder, by turning which with an ordinary wrench, it is possible to loosen and remove any earbon deposit with a small instrument and without dismantling the motor. In addition, each cylinder is provided with a priming cup, making it unnecessary to remove any of the spark plugs should priming be necessary in rold weather, and liberal inspection plates are fitted to the upper half of the eranknase. Thus the designer has taken into consideration that the truck may be placed in the hands of those unaccustomed to working upon the automobile power plant and the labor incidental to proper care has been reduced to a sufficient

Simplicity is combined with sturds construction throughout. The lubrication is by a combination force feed and splash system in which all the operator needs to do is to pour in the oil. Helow the crank-use is a sub-tank or sumi, into which the oil is poured, and from which it is constantly forced through a \$\tilde{\pi}\color{\text{pt}}{\text{int}}\$ pipe heritorated sions its sides, by a positive gent pump. This pipe surfays lubricant onto cranks and hearings and line the cylinder casings. The cranks also did fint to the lower crank-use and aid in the distribution to all working parts. The constant level is maintained in this lower crank-use, the overflow running into the sump. An



culation, even when the engine Two blews of tvery Wood Ping Tire and Wheel Extension, Blustrating Method of Bringlag Lags late below.



William Larson Utilizes Avery Parm Truck to Pull Three 14-laced Plans at the Mate of 18 Acree a Day on Short Land
oil gauge permits the driver to determine the exact level at
a glance.

very best alloy steel. Every gear in accurately cut.

Two sets of spark plugs are fitted, ignition being by a double system, employing a magneto and storage battery. The company calls attention to a feature of this system, by which it is possible to connect either the battery or magneto readily with either set of plugs, so that it is never necessary to run the engine with one or more cylinders missing, even though the battery may be week and the magneto plugs are not working properly. The gasoline capacity is 23 gallons.

Clutch and Transmission.

The clutch is a multiple disc member of the Avery Company's own design and manufacture. It consists of 13 discs, six of which are of 13 inches diameter and the other seven a triffe smaller. These are contained within the fixwheel and run in oil, this hot only acting as a lubricant but serving as a cushion and causing easy engagement and release.

The transmission is of the selective sliding gear type, simple in construction and silient in operation. The design is such as to provide three speeds forward and reverse, these changes in speed being effected with ease. The extra large goars are made of special alloy steel, accurately cut and tested for hardness. These operate on Timkon roller bearings, which reduce friction to a minimum. Between the clutch and transmission is a universal joint of ample size, boused in a dust proof casing and running in oil. This sids in keeping the main components of the generation and transmission of power in exact alignment under the most severe conditions of service.

The countershaft is large, running on Timken roller bearings. The bevel drive gears also are extra large to meet the requirements of their work and are made of the very best alloy steel. Every gear is accurately cut and tested for hardness before being assembled. They are housed oil tight and dust proof, and it is claimed that bard service will disclose no nunreclable wear except a brightness tool

Final drive is by double side chains to the rear aile, which is 2.75 inches in diameter. The drive sprockets are fitted with 13, 17 or 20 teeth in front and 5.1 or 5.5 in the rear, although any combination which will best suft the work can be furnished, and extra sets are supplied without charge. These are made interchangeable, as also is truor all parts throughout.

In a vehicle of this nature it is absolutely necessary to provide efficient parket, which shall be capable of bolding the truck on the steepest grade or for exceptionally quick stopping, the latter being particularly true when exagged in plowing land in which stones or stumps are liable to be present. Each rear wheel and each end of the construction of the construction of the construction of the provided with an internal brake of the expanding and have three-linch faces, will et those on the dense and after the construction of the countershaft have diameter of 12 inches and faces of two. The wheel have shows are held by double radius hars extending to the countershaft, and thus the startin of stupping the truck countershaft, and thus the startin of stupping the truck countershaft, and thus the startin of stupping the truck countershaft, and thus the startin of stupping the truck countershaft.

Brakes, Frame and Springs.

The frame is composed of four five-line steel plates, with cast steel spread blocks between each pair of plates, all riveted together, making a strong and rigid, though flexible assembly. An accompanying illustration should plainly the general construction of the framework and the location of the working parts. It will be noted that



J. F. Sweapy of Stafford, Kan., Shelled 800 Bushels of Corn, Employing His tvery Farm Truck as a Stationary Engine.

front is narrowed, which permits of a wide awing of the front sheets and make possible short turns, such as are front sheets and the policity, and the properties of the steerrequired in ploying, etc. A double rice documents the steering arms, one behind, this one behind, this one behind, this of in case one arms or per old one properties of preventing accident in case one arm or one rod of the standard automobile design, and offers no complications for the instantienced operator.

The entire load, motor, transmission and frame, is carried os strong leaf springs, those in the rear having 13, leaves three inches wide, and those in front having 11, 2,5 laches wide. Wheels are 41.5 inches in diameter. The wheelhase is 140 inches and the treas 62. The regular bed is of hard wood, 52 inches wide and 123 inches long. The carrying capacity is three toos, and the net weight with platform and 20-inch box is 5875 pounds. Special bodies may be fitted upon order.

Novel Wheel Equipment.

A particular feature of construction is to be found in the tires. The wheel rim is of cast steel, perforated and filled with two-inch round hard wood plugs, driven in seface stains which to push. They are drawn back by the springs and return to their original position when not needed. It will be seen that their action is cuttrely automatic, coming into play the moment they are required and slippling back out of the way when their work has been accomplished. For such work as plowing or harrowing the lugs can be fastened permanently in an extended position if

Plowing, Discing and Harrowing.

Accompanying illustrations present the Avery farm truck at work on so-called small farms, and indicate some of the many uses to which they may be put. Other instances will be cited, and while it is impossible to give a detailed comparison between the cost of these vehicles and that of lorses, for the reason that farmers have not been given to keeping accurate account of such matters, it can be shown that one such truck will do the work of from six to 10 horses without difficulty and at a decided assign in expense.

One very pronounced difficulty comes to mind readily when considering the use of a truck of this nature in plowing. An accompanying illustration shows William Larson



Discing and Harrowing at the Same Time with Avery Parm. Truck on Miller Bros.' Parm in Bliss, Okla,

curely. These pluss are placed diagonally across the face of the rim and form a smooth surface, the steel rims and wood plugs providing the necessary grip for travelling over soft plowed ground or muddy roads. It also is claimed that they run over hard roads, marsadam surfaces or payed streets, without injuring them in any manner. The pluss will wear for a long time when travelling over ordinary dirt roads or in the field, and can readily be driven out and replaced at small expense, when it is necessary to re-new them. The wheels may be furnished with one, two or three rows of plugs, as desired.

Besides the special construction of the wheel itself, an automatic extension is provided for each of the rear wheels, this being designed for use when the fields are exceptionally soft or the roads are very mody. Each consists of two wrought from bars between which are heavy cast luss eight inches in width. These luss are mounted on pivots and the points are held below the surface of the wood piuzs by means of springs. When the wheels travel over Buildy roads or soft ground and sink so that the points of the lugs touch the ground, the revolution of the wheels cause the lugs to be extended vertically, 4.5 inches beyond the periphery of the wheel fixed in the property of the wheel fixed in the wheels are the property of the wheel fixed from the fixed for the property of the wheel fixed from the fixed for the property of the wheel fixed from the fixed for the property of the wheel fixed for the fixed fixed for the property of the wheel fixed from the fixed for the fixed fixed fixed for the fixed fixed

hauling three plows behind his Avery, and he says be can plow 10 acres a day, working on short land about 80 rods long. He adds that the truck keeps a straight furrow without being steered, and that the expense of plowing is confined to suproximately two gallons of gasoline an acre.

But, granted that it is an easy matter to make the truck keep a straight furrow, how about the turn at the end of each furrow? Clayton Spratt of Auburn, N. D., plowed 150 acres with four 14-inch bottoms on old ground, averaging 11 or 12 acres a day with a fuel consumption of about two gallons to the acre. He also tried this equipment on some fresh sod, just to see if it would accomplish the work. The 150 acres were plowed on land of 25 acres, plowing six rounds and taking the plows out of the ground at the ends, after which they were not lifted again, as the machine was driven around the ends.

Miller Bros. of Hills, Ohia, estimates that its track will do the work of eight horses in plowing, diseting and harrowing. The machine shown herewith pulled three 14inch bottoms with a harrow attached behind, and worked at the rate of an area an hour. The photograph depicts it hauling two disc harrows with 14 discs to a harrow, and two drags, a load which would have required eight horses. to draw. After the ground was prepared, the truck pulled two 12-hole disc drills, drilling in the seed, a work which it is claimed would have been heavy for 10 horses.

An Ali Around Machine.

Apparently, Harrey Shippy of Chapman, Kan, found one piece of work which he could not do to advantage with the truck, that of plowing or cultivating corn, He employed four horses for this job, doubliess because he has not yet found a way to run the vehicle over the ross without crashing the tops. However, it did all the rest of the work on his two-acre farm, including plowing, discing and harrowing, 130 acres of which was cared for in the fall, cutting 125 acres of wheat, running, a four-roil shredder, shredding corn, hauling sand, grading eight miles of road, in the inst named work getting close up to the hedges where It was impossible to go with horses. The expense for the year was finited to oil and gasoline and one set of little boxes. The fuel bill totaled 559, which he says is ever so much cheaper than hav and trea!

In the chassis view, herewith, the pulley at the front is the purpose of attaching a helt for use as a power machine of all sorts. J. F. Sweany of Stafford, Kan, shelled kan hushels of corn with the truck shown in an accommaning illustration, without stooping and with a trial start of at least one man. His work is principally that of covering an oil route, averaging eight trips in six days, five of them of 40 miles, one of 32 and two of 20. The average expense of the 40 mile trip for oil and gasoline is \$1.40.

Thus is presented the argument for the Avery farm truck it is an all around power machine. It will had loads on its own hody as well as in trailers. It will do the plowing and field work, and all kinds of belt work. it will do the work of from six to 10 horses, and it costs less for gasoline to run it than to feed the porses necessary to do the same work. It saves money besides being easier to take care of and handle. It saves the expense of keeping surplus horses for use only in rush seasons. It doesn't eat anything when not at work. It requires one-tenth of the storage space pecessary for horses and the hay, corn and oats they must eat. It is possible to do the work when it should be done regardless of weather conditions. it makes for larger crops by doing the work right. It will haul a load in from one-third to one-half the time required by horses, and even faster if necessary. It will work as many hours as needed. and when the work is done it is simply backed into the shed, the switch is turned off and the labor is ended. It doesn't have to be cared for at regular hours on Sundays and holidays. It is ready for work instantly. It is possible



J. A. Wattner of Freeman, S. D., Hauling 198 Hushels of Wheat to Market with Avery Farm Truck and Two Horse Wagons as Trailers.

at that. He says he had enough power to operate the sixhole sheller and pients of reserve.

After plowing with three 14-inch bottoms in a field of 80 acres against three three horse teams, each pulling a 16-inch plow, in which work he turned over 58 acres while the horses were turning over 30, and using his machine for ail sorts of work throughout the summer, J. A. Waitner of Freeman, S. D., loaded the truck and two horse wagons as trailers with 198 hushels of wheat. The camera caught him on the way to market, on which trip he drove at the rate of six miles in 57 minutes. Using these same two wagons in the same manner, he carted seven tons of hay to the haler at a trip. After balling the hay, he put 70 bales on the truck, loaded the two wagons with 4.5 tons more and hauled this load a distance of 20 mlies, most of the journey on the high gear. He says he finds the machine more convenient to handle around the farm than horses. narticularly as it is ready to go at an instant's notice.

Ashton Rollins of Three Rivers Farm, Dover, N. H., uses the Avery truck to haul lumber, potatoes, apples, etc. During the late summer and fall he cut silage and run a small saw mill, taking day work among the nelghbors. He also did at the plowing and harrowing on his farm.

E. W. Parsons of Jenuings, Kan., says he can do the work of three four-horse teams with an additional saving

to start right in at work the first thing in the spring, without waiting to get seasoned. It is easier to handle, and backs up quicker and just where it is desired to go.

SCIENTIFIC HAULAGE COSTS.

More and more firms are beginning to appreciate the need for selentific analysis of their handsac costs, an Indication of which may be seen in the fact that the American Locomorive Company's transportation rost bureau sercently called upon for such analysis by 102 large concernin 37 different industries.

WOMEN TAXI DRIVERS.

Takienh operators who have been troubled with dishoredly and Inefficiency amount their drivers will no double watch with Interest the experiment of a Chleago takish company, which has hired 20 women as chaufleurs. The company expects that the new recruits will be more honest, careful and respectful to patrons. Walle the change is 87 far only an experiment, abroad women tax drivers have been thoroughly successful, Paris having found them to be as good as the men, and better in some respects.

UNITED STATES ARMY FIELD WAGONS.

SOME little surprise will no dout be occasioned by the statement that the government has taken steps to obtain from commercial car manufacturers reports of the sale of each machine, with the address of the purchaser and the size and power of the vehicle. An impression exists that this country is far behind the European powers in its preparation for utilizing motor trucks in military operations, but according to Capit. Alexander E. Williams, 19th Infantry, E. S. A., witting in the Infantry Journal, the United States has some further than any foreign country in its experiments with automobile transportation for the armsy.

A large number of experiments has been made in all parts of the country, employing trucks under all conditions and for many various uses. Betalis of these have naturally been kept somewhat private, and comparatively few sart truchars have reached the public, with the exception of where purchases by the government are used as a basis for advertisement by the manufacturers. Besides the information of the property of the property

War Hepartment has detailed intermation of the number of trucks being manufactured and sold in this country, with the mechanical features of the various makes. All this data, coupled with the records of the sales of machines, will give the government definite information for use itt rase of war, and will prove invaluable. Itesides being able to select the machines best suited for war purposes, the sales records will show the capacity of each factory, enabling emergency rush orders to be placed where they will be filled quickest.

That no misapprenension as to the nebl of the motor truck exists in the War Bepartment is madeclear by Uapt. Williams' article. The severe for which they are desired is to transport supulies from what is called the rail head, the terminus of the railroad meaner the field of operations, to the field. It is not expected that the trucks can go across country

to the actual cumps, which may be far from a road. For this work, the regular mule transport system will be used, taking the supplies from the trucks on the heatest

Developing Field Truck.

The government hupes, however, to secure a machine that cut take the place of the ecourt wagon and nucles as an easies of transportation for the troops in the field. This is seen in the fact that after considerable study of the stimation, is o special machines are being built to the Warr Department's specifications, one with claim drive and the other shaft driven. They will be of one and 1.5 tong capacity, respectively, and will be thereingly tried out in all the work that a field wagon is called upon to perform. No details of the machines have been given out, but they will probably be light, with high wheels affording a big road cicarance. While the road trucks will each replace several mule teams, it is not expected of the new field trucks that they will be form more than the work of no mule wagon.

they will perform more than the work of one mile wagon Capt Williams gives some very interesting figures comparing the costs of motor and mule transportation, show-

ing the motor equipment would cost for fuel and the shall halfwhat the mule would ext in oast and hay, and that the actors would take up on the road \$22,505 fately, or over four in miles, less that the mule ratin—a valuable considerable when trains have to be conveyed by troops in passing through a hostile country.

Forage for 3268 Mules for One Month;

	Wetght,	necupited, cubic feet	Cust
1PB1=	5.5.2.25.00	32.133	\$14,770.70
tray:	1,172,540	11 F IND	19,170,67
			-
Totals	2,051,926	E 44,5H5	\$21,001.37

| Insoline for S07 Trucks for the Month; | Gallons | 10.86,80 | 622,120 | 18,368 | \$12,105,00

Besides the saving of \$12,836.37 presented here, there is a difference in weight of 1,431,500 pounds in favor of the fuel for the motors, and a saving in space of 127,200 cubic



the field. It is not expected that Main Vrmy Field Wagon Which Took Part in the Recent Test Run from Washington to Fort Benjamin Harrison, Indiana,

feet. It may thus be seen that the bulk of the gas-dimensial be less than one-seventh of that of the forage, which would herein, bedde the saving in the cost of transportation a great economy in the space required for storage at depots, an exceedingly valuable consideration in time of active operations. Also, the gooding tanks on the trucks take no space from the louding pittorm, while the forage for the mule teams requires considerable room on the warming.

In an Emergency.

It is not contemplated that the covernment shall purchase a large number of trusks and hold them III was time, but a subsidy of privately owned machines of approved types is recommended. In case the new vehicles prove a ancess, semewhat of a problem is presented in the matter of renderline a supply available in time of war. It has been suggested that this military type of treek would be lout little unsuited to use by private concerns, and that a substantial subsidy would induce purchases for business use and give the government a large feet of machines from which to draw in an energyon. If there were no large privately owned fleet of machines available to the government, the only alternative would be to accumulate and store in various parts of the country a sufficient number of trucks to meet the requirements of an emergency. This would be much more expensive than a subsidy.

Either method appears expensive, but one or the other must be employed unless the government wishes to trusted to the rather uncertain chance of acquiring machines tested to the rather uncertain chance of acquiring machines the War Department has purchased mules immediately on the War Department has purchased mules immediately on the outhreak of bostilities, and has had little delay in titing out the road trains, but if motors of a particular style must be depended upon, considerable difficulty will be experienced unless some provision be made, through subsidy, or otherwise, to secure machines in advance.

Of the two methods, the aubsidy presents the more advantages. If the trucks were to be bought, when of no further use at the end of the war, they would have to be the further use at the end of the war, they would have to be the storage deposits. But if secured under the aubsidy scheme, at the end of the war the trucks would have a ready sale, and would realize their actual value, or could be returned to their original owners at a suitable price.

Just how far this country is ahead of European powers in the matter of motor truck transportation for the army

While the revent road test conducted by the quartermater department of the United States Army was conclude about April I, no definite announcement has been made cocerning the results obtained. The event was in the sature of a competitive run of 1509 miles, starting in Washingson, D. C., thence to Atlanta, Ga., and through the South, and ending in Port Replaimi. Harrison, Ind. Five cars were entered as follows: Autocar, Autocar Company, Ardmen, Penn.; Four Wheel Drive, Four Wheel Drive Auto Company, ('Ilintonville, Wis; Mais, Mais Motor Truck Company, Indianapolis, ind.) Sampson, Aiden Sampson Manufactuing Company, Detroit, and White, White Company, Clerland, O.

If it were the intention of the government to set a task almost impossible of accomplishment it succeeded remarkably well. The route, for nearly 1400 milles, led over roads deep with mid and filled with washouts after a severe will-set (er, and in many of the mountainous sections wagon (raffic the above the many for the mountainous sections wagon (raffic from the quagmires. It was not in every way the most stream-ous test to which motor trucks have been subjected in this country. The complete details will be awaited with interest.

The vehicles were equipped as regulation army wagots, as the accompanying illustrations bring forth. Each was



Two of the Vehicles Which Completed the Recent Army Road Test: M Left, Sampson 1,5-Ton Truckt at Right, Antocar of Same Capacity,

may be seen in the statement of Capit, Williams that while the foreign countries have trucks for road use as here, they have not made any plans to develop a machine switable for field use, and do not expect that any such machine will ever appear. This country not only has made plans, but has designed and is having built a machine which it is hoped will prove suitable for field service; if it does not, another attempt will be made

This is quite in contrast to the view in England. In an article on the subject, Col. Paul, assistant director of transportation, British Army, stated that no mechanical vehicle exists at present which is trustworthy for supply train work, in distributing supplies over every kind of country off the roads, and that no sultable vehicle is to be expected in the near future. While the United States War Department agrees with Coi. Paul on the first count, that there is no truck at present suitable for field work, it does not agree on the second, and is actively at work trying to develop a machine that will enable the supply train to be motorized. The government expects to take supplies from the rall head to the advance depot by ordinary trucks working over the roads, and from the advance depots to the troops in the field by means of specially designed machines capable of traversing almost any country.

manned by a driver who thoroughly understood its construction, and a United States soldiers, who watched is struction, and a United States soldiers, reported their findings to Capt. H. A. Hegeman, quartermaster departtment, Fort Benjamin Harrison, who will make known the

Condition of the Roads,

The roads were in even were condition than the arms officials anticipated. From Washington to Richmond, Va. and until the North Carolina line was reached they were not difficult, despite the rough and fee covered spots. But once in North Carolina, it was all the care could do to make headway at times. It was all requent occurrence for a truck to drop into a hole up to the hody, when it would be necessary to spend hours with block and tackle getting it out.

In many places the mountain roads were so steep and so conted with let that it became necessary to pured branchers of trees over the ground and chop a series of steep in the lee to facilitate traction. Near Jeffersonville, Ky., a stretch of mud was encountered which proved too deep for any of the trucks to awrigate under their own power, and all were forced to utilize block and tackle applied to the telegraph poles, in order to extricate themselves.

KISSELKAR TRANSPORTS ICE

In transporting ice in warm climates it is essential that no time be lost in the hauling because of the possibility of shrinkage. The commercial vehicle is particularly adapted to this work, luasmuch as large quantities may be handled easily and hauled long distances in a very short time. The Kane & Trainor Ice Company, Stockton, Cal., a large dealer in this commodity, is utilizing the mechanical transport with success and in the accompanying illustration is depicted a truck fitted with a special body for the purpose of handing ice.

The vehicle is the product of the Kissei Motor Car Company, Hartford, Wis., and is propeiled by a four-cylinder, four-cycle, water-cooled motor. The clutch is a large cone of the adjustable type and power is transmitted through a selective type of silding gear transmission, affording four speeds forward and reverse with direct drive upon third. Final drive is by side chains of ample dimensions. A feature of the rear system is the fitting of a differential lock, a device whereby the driving axies may be locked as one member, thereby facilitating traction when one rear wheel is in mud or on slippery ground. It also provides for an staff of the Universal Motor Truck Company of Detroit. It will be remembered that W. E. Flanders, president of the E-M-F Company, now a constituent of the Studebaker Corporation, recently acquired an interest in the Universal company.

BRUSH AS VACUUM CLEANER.

A vacuum cleaner company in indianapolls, Ind., recently equipped a Brush runabout, made by the Brush Runabout Company, Derroit, with some of its machinery for cleaning houses, etc., connecting the shaft to the regular driving shaft of the car by shifting the chains. As a result the automobile is utilized in hauling the cleaner to the scene of operations and takes the workmen ajong with it.

This Brush car has been working in this manner every day for a period of five months, during a greater portion of which time the working hours have been as high as 14 and 15 a day. No replacements have been found necessary and the owner considers that the test has been much more severe than would have been the case in ordinary driving over the roads

Since noting the sucress the concern has had with this



KinnelKar Truck in Service with the Kane & Trainor Ice Company, Large Dealers in This Commodity at Stockton, Cal. emergency drive in the event of a chain breaking, as the car could be propelled by the remaining member. The

Kane & Trainor ice Company is very much pleased with the truck, it having demonstrated its value, economy and power in the transportation of ice.

LYNN BUYS FOURTH TRUCK.

The city of Lynn recently took possession of its fourth municipal truck, this being a one-ton vehicle for the use of the street department. The commissioners are still considering the bids submitted for the police and fire department wagons, which were opened recently. The next purchase of this nature will be a vehicle for the use of the health department.

PELLETIER WITH UNIVERSAL

In addition to his other duties as advertising director of the Studebaker Corporation and advertising manager of the Flanders Manufacturing Company, E. LeRoy Pelletier, well known in the industry, has joined the advertising

vacuum cleaning outfit, several other cleaning companies are planning to utilize cars in the same manner.

MOTZ TIRE EFFICIENCY

The Motz Tire & Rubber Company, Akron, O., maker of Motz cushion and soild tires, is calling attention to its product and its effect upon the commercial vehicle industry in a near little bookiet of 24 pages, which will be sent free upon application. It is pointed out that when the tire expense is considered it will be found that the wheel equipment is one of the most important features in connection with the operation of a mechanical transport. The booklet sets forth numerous ways of bringing about tire efficlency and thereby reducing materially the cost of maintenance. It is fully litustrated and will prove a valuable treatise for those who are troubled with tire problems.

D. R. Linsley, formerly with the Pierce-Arrow Motor Car Company, Buffaio, N. Y., has joined the sales force of the Chase Motor Truck Company, Syracuse, N. Y., and with make his headquarters in the latter city.



VOL. 10. MAY, 1912.

AUTOMOBILE JOURNAL PUBLISHING COMPANY

Times Bidg., Pawtucket, R. I.
William H. Binck, Treasurer. D. O. Binck, Jr., Secretary.

Publishers of

THE AUTOMOBILE JOURNAL THE ACCESSORY AND GARAGE JOURNAL

Phone Pawtneket 1000,

EDITORIAL DEPARTMENT;
CARL A, FRENCH.
WILLIAM W. SCOTT.

ADVERTISING DEPARTMENT

New England—

John W. Queen, 6 Beacon Street, Boston, Mass.

Control States—

W. R. Blodgett, 25 West 42nd Street, New York City.
'Phone Bryant 3728.

Western States-

G. A. Eidredge, 304 San Building,
Detroit, Nich. 'Phone Cherry 1953,
P. G. Lurian, 4507 Ciliton Ave., Chicago, Iti,

PUBLISHED THE FIRST OF EACH MONTH.

SUBSCRIPTIONS:

The United States and Mexico, the year, \$1 in advance; Canada and Foreign Countries in Postal Union, the year, \$2 in advance. Fifteen cents the conv.

ADVERTISING RATES:

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding, Anonymous communications not considered. Correspondence on tors, all motor driven farm, fire, and musicipal apparatus, the motor industry and the trade, will receive attention. Stamps, must be enclosed to insure return of unsolicided

Entered as second class matter, February 25, 1911, at the Post office at Pawtucket, R. I., under the Act of March 3rd, 1879.

TAXING THE MOTOR TRUCK.

Automobile owners have submitted so long to the proposition of taxing their property for the cost of highway construction and maintenance, in which the entire public benefits, that perhaps it is not surprising that there should be effort to Increase revenue by including the motor truck. However, there is a hopeful sign in the decision of certain motorists in Jackson, Mich., to test the constitutionality of the new law in that state. It also will be remembered that the New York State Automobile Association threatened to take the matter into the courts if the legislature persisted in its desire to enact more radical legislation on this subfect there.

Massachusette is setting a bad example with its latest bill to tax all automobiles, whether pleasure cars or trucks, on the horsepower basis. The industrial transport is a business proposition, and business men who may submit to conditions which concern their social life are prone to look upon matters which affect their business in a very different light. It may be that pressing the proposition too far will result in the discovery that the whole plan of taxing motor vehicles in this manner is class legislation, as many have suspected.

Chairman Charles Thaddeus Terry of the American Automobile Association has expressed the situation in the

statement that motorists have submitted to this form of legislation only because of their interest in good roads. There is bound to come a time when they will no longer submit, particularly when the true economic value of the modern method of transportation is better understood and ampreciated.

BUSINESS VALUE OF PARADES

The second annual motor truck parade in New York City this month brought out an increase of nearly 100 per cent. In the number of vehicles in line. To those who have direct interest in the production and sales of industrial transports this has important significance, and the business man who carefully analyzes the situation will find much food for thought in this demonstration.

The day is gone by when concerns were purchasing and using commercial vehicles because of their advertising value. Every truck in service today represents a factor for economy and efficiency. Of course, by no means all the instaliations in the metropolis were represented, but undoubtedly the increase in number of vehicles on parade is a fair indication of the increased number in use.

This brings up the suggestion that there is decided value in these demonstrations; quite as much, if not more than in some form of competition. Other cities will follow the example of New York in holding similar parades throughout the year, and the practise should be extended even to the municipalities of the minor class. While these vehicles are in daily operation on the city streets, some organized attempt to rall the attention of the business public to them will create a decided impression and set other business men to considering the possibilities for motor haulage for their individuals needs.

THE LIGHT DELIVERY WAGON.

While the manufacturers of commercial vehicles have been seeking to develop a demand for their product with certain lines which require heavy duty machines, perhaps there has been a lack of interest in the small husliness, the needs of which are confined to the likelt delivery car. That there has been some appreciation of the possibilities along this line is evidenced by the number of such wagons which have made their appearance of late. Still, there is room for question as to whether or not sufficient attention has been paid to the requirements of the individual purchaser.

Special body designs are quite common, particularly with respect to the dumping wagons and so-called brewery trucks. There is quite as much reason for considering the small delivery business, however. It is conceded that a motor truck, no matter what its load carrying ability, develops its greatest efficiency only when worked to its capacity. Many small wagons could be utilized to advantage it it were possible to supply the carrying space so arranged as to provide for the exact requirements of the owner. This is a phase of the situation which is only just beginning to be given the attention it deserves, and there is much indication that it will receive careful thought and experimentation during the coming season.

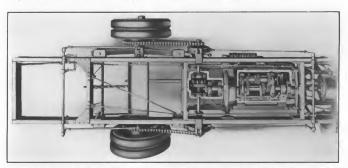
CHARACTERISTICS OF TRUCK DESIGN.

Developments in Construction That Have Eliminated Weaknesses and Made Possible More Uniformity of Strength and Greater Endurance of Chassis.

EVERY motor vehicle designer has sought to incorporate in his creations the desired elements of power and strength, and assumedly each man has satisfied himself that his conclusions are dependable, but with experience changes have been found desirable or necessary, often because of unexpected stresses and strains. No machine has been constructed that can be accepted as being absolutely without flaw. With some, faults will be more pronounced than with others, and when it is realized that the greatest strength of a construction is its weakest part there is the more need of studying every component and eveloping all so far as this may be done to a proportionate and harmonions whole.

This statement is made, not to condemn, but to justify changes and betterments in what may appear to be the unimportant details. In fact, there is nothing that is not

a pleasure car. He can take nothing for granted and he must know that what he has planned will work out in every detail with a certain margin of safety and endurance. The truck is often worked to an extreme by the driver or owner who believes that he is justified in loading beyond capacity, and driving to extreme speed, causing strains that are not possible with normal freights and operation. The responsibility for damage through overloading is generally shirked by the owner and driver, and pretense is made that the builder is at fault, because it is hoped that he will be either compelled or induced to assume the expense under a guarantee. There are limitations prescribed in every guaranty that are expected to protect the builder, just as the conditions afford protection to the owner, but the line of demarcation, if finely drawn, will often precipitate complications and perplexing situations.



Tap View of Eckhard Chassis Back of the First Clatch, Showing the Very Large Transmission, the Second Clatch, lifferential, Sub-Frame Suspension, the Long Torsion Bar and Torsion Chain, All of These Being Features of Construction.

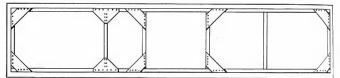
necessary in a chassis, and from the smallest to the largest part each must be in correct relation to the other because all must endure, or should endure, the same length of time and under the most severe conditions of service. There is this fact to be considered in power wagons, that continuity of operation is imperative, and there can be no experiment made which will result in loss to the owner or reflect upon the maker. The mechanical transport is bought because it is tireless, and has speed and capacity that will save in time as compared with animals and minimize manual labor. Sentiment is out of place in business dealings and undoubted economy is the only logical reason for making investment. No man wants to take chances in business. He must be assured of improved delivery or haulage and insured against any possible delay. He cannot afford to make sacrifices. Once he is the victim of circumstances, not pegligence or fault, he will lose confidence, and this reacts upon the maker of the vehicles that he owns or owned.

The designer of the power wagon has to deal with an entirely different proposition than the man who produces

The manufacturer of vehicles must give his customers satisfaction because of the competition and the future. He realizes that he must make a guarantee that is liberal, largely to create confidence in his machine, and when this has been established it is necessary for the designer, so far as he can do so, to protect the builder against this guarantee. This being so the chassis must be studied for weaknesses and each element carefully observed through varying conditions of service. It may be that one part of seeming insignificance will be the keystone of the entire structure. Every other component may be adequate, and yet all are insufficient because of the failure of the one. It is sensible that with the improvement of this element an entirely different character of service may be obtained. It may be a matter of workmanship alone. But whatever the cause it is necessary that it be eliminated.

Frames and Springs.

In the motor vehicles there is no more important part than the chassis frame. With rare exceptions these are of metal and usually the material is steel. Wood is sometimes



Top View of Channia France at Vice 6,5-Ton Track Covered by the Hody, Shawing the Six I ross Members and the Reinforce ment by the Large Guaret Plates.

employed and occasionally angle iron, but generally the members are channel section steel of differing grades, the form being determined to secure ample strength and the least weight. The members are formed of metal selected for its strength, which is often heat treated to insure this quality to the extreme. But with strength the next consideration is lightness, and while a frame may be strong the members may yield to varying strains. In the absence of temper that will resist distortion and conform to a certain shape the frame is expected to have a degree of clasticity that will protect it against stresses that might otherwise cause breakage. The frame members ought to be well assembled that there be no failure of the bolts and rivets, because wear will quickly develop at a rivet or bolt and the breaking of a single fastening will permit such excess distortion as to cause much damage to other members.

Every steel frame can be twinted, Complete rigidity would be folded were it not impossible because of the farein weight necessifiated, and impractical because of the large proportion of power that would be required to propel it. The frame is supported by four or more springs that are assumed to protect it against excessive stresses and vibration, but the wheels always counter with the road surface and abound one drop below the plane in which the others are moving the support of the frame by the spring carried by the wheel is lessened, and for a very brief interval there is an entirely different stress upon each member. This constantly changing condition of operation must eventually have effect upon the frame structure. The vibration results in metal fatigns, which is evidenced by breskage and can only be renedled by resented or sentent or restoration.

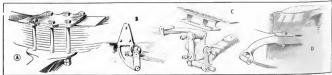
The frame is supported by the springs at either end and as the support of these is writishe and as the shocks from road obstructions are transmitted through the springs, the agreement of the frame is at the ends and least at the centre. The most intense tibration is when the machine in driven unlended, and the most stress is when driven loaded. As the motor is heavy and is carried forward it is often supported by a sub-frame attached to the chassis frame. The engine is expected to move with the chassis, but to avert leverage pressure upon the shaft universal joints are installed in the driving system. In several instances the power joint is made a with and connection in

to the cross members forward of the chassis centre. The drive is by shaft to the jackshaft located back of the centre, and by side chains. There are other forms of construction, but these are the exception,

Reacing the Assembly,

in the construction of the chassis frame the attention of designers has been directed toward bracing the assembly to minimize the twisting stresses and to secure so far as this may be practical a more general movement of the whole. The steel channel side members are connected by cross members of the same material. These are hot riveted in the best work and heavy gusset plates are used to brace the angles of the members against longitudinal or lateral movement. Theory would dictate that these gussets be proportioned to the frame, but that the same construction obtain with each. Opinions differ widely, however, and with the varying designs it will be noted that as a rule the number of gussets is increased with the size of the frame. This is especially noticeable with the Alco 6.5-ton chastiframe, in which every angle from the rear of the frame to the end of the platform space is braced. These gussets are usually placed at the top of the frame and seldom on the lower angles, there being evidently an assumption that sufficient strength is afforded with the single series of gussets. There is not, however, the same degree of rigidity that would be obtained with two sets of gussets. The example of the Alco is given as an Hustration of advanced engineering with heavy trucks, and in connection with this is shown the manner of bracing the frame of the three ton Pope-Hartford truck, in which the same practise is followed, but not as completely as with the larger Alco.

Few realize the driving stresses upon a truck frame because, under cenditions usually obtaining, the drive as through the radius rods from the rear axie to the transand there is the influence of the threat at either side, which cannot be equalized unless each wheel has the same tration and the differential is locked. With the radius rade fast to the axies there is resistance by the rods to the uzed, which lessens the strain upon the springs, but there is decided influence upon the frame hecause of the rada and the drag of the chains on the transmission unless the clutch be disensaged.



Some Examples of Spring Installation: A, Grabowsky Hear S pring Anchorage; B, Poeward Hangee and Shackle of Daylor Rear Spring Construction; C, Barrel Shackles and Buffer of Grabowsky Platform Spring; D, Short, Heavy Spring flors of

in the event of wear of the radius rods or their connections the stresses are partly taken by the springs, which are not constructed for such work, and the result is not



The Strongly Braced Lond-Carrying Section of the Pope-Hartford Three-Ton Truck Chamis,

only destructive of the aprings, their boits, shackles, clips and hances, but affects the chassis frame. The drive influence differs with the manner of loading. When a frame has sagged and been set out of line it will be understood that every other element is affected, provided that they are connected with the members. This applies to the levers and connections attached to the frame, to the shaft alignment, to the transmission, the jackbaft and its bankers, and to the radius rods and brakes, because there is lessened and excess movement as confused with the normal action.

The frame, because of the reasons stated, is the keystone of the entire structure, and if it does not at all times maintain the elements of the track in precise relation there is a certainty of abnormal wear and, perhaps, rapid deterioration, In the Eckhard chassis the designer has not only nosed conventional construction so far as the radius road and springs are concerned, but he has provided a torsion rod that is connected with the front and ergar axles and

fitted with heavy spring buffers that relieve the radius rods of the neward forward thrust and applies a horizontal forward thrust from the rear axle to the front avie This also lessons the stealn on the forward springs and permits a more normal suspension by carrying the drive to the forward wheels and distributing the road shock stresses throughout to the beavy rear construction. This is an adaptation of the wagon perch for the maintenance of distance between wheels to the needs of the motor wagon. It is said that this works out exceedingly well in practise,

To minimize turning arress upon rear axie when wheel brakes are used, and good Jukament would dictate that their use will mullion any strain upon the transmission, a torsion chain is employed. This is attached to the rear frame cross member and carried to a hook on the end of a vertical arm at the

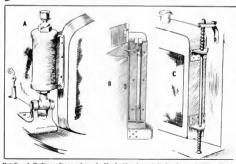
centre of the axle, and beyond a moderate stress upon the springs the chains restrains the twist of the axle.

The strain upon the rear spring saddles is at times

extreme, and it often results in broken spring clips and a disabled machine. In the Grabowsky truck the aptine clip has been eliminated and in its place is used a plate practiculty the same size as the saddle. This is drilled for six bolts, and two of these pass through the axide and the other four through the axidit, so that when all are tightness the elip. Should a bolt break it can be replaced without difculty, white a broken clip cannon always he readily obtained. The substantial work and the simplicity of construction are in every way commendable, and the increased strength is much to be desired.

With a majority of the designers the purpose is to protect the springs against wear and to accomplish this a longer member is used because of the lessening of the number of vibrations with increased length, and the decreased movement of the spring at the eye. Bronze eye bushings are the rule rather than the exception because of the longer wear with steel bolts than with the same metal contacting. And the value of inhricity at these bushings has led very generally to the use of grease caps. With all designs that which is simplest is best, and an example of both the practical and substantial is to be found in the forward hanger and shackle of the Dayton rear suspension. This is a steel drop forging of bracket type that is fitted under the frame member and is riveted to the side. The linkage is very simple and is easy to replace should there be wear or breakage. There is a very wide play for the spring.

The construction of the Grabowsky platform spring is worthy of notice because of the linkace, which minimizes the wear upon the spring eyes and insures freedom of the spring action, tosether with a certainty of complete lubrication of every-both and bushing, this making for long endurance. Each bearing part is fitted with a grease cup and this makes certain that there will be sufficient lubricity with minimum attention. Fitted to the under web of the frame side member is a metal pad that contacts with the side spring end when the truck is loaded. The welskit of the frame and its equipment is normally carried on the likelite views spring, but the load is always supported and steadled by the side springs, the end springs being consumity com-



Details of Hadiator Suspension: A, Shack Absorbing Cylinder Type of White Trucka; B. Rod and Bracket Support of Pope-Hariford Machines; C, Spring Mounting on Sanford Vehicles.

pressed to the point where the side springs take the full load. This is held to give the same results as with the use of the side springs and an auxiliary or jack spring. All the Grabowsky spring eyes are steel bushed. To make certain of the full clearance necessary with the springs without using a sharply curved member that would neces-



The Combined Transmission Case and Hifferential and Jackshaft Hunsing of the Locomobile Pive-Ton Track.

sarily have excessive action, and to earry the front atle sufficiently forward to perch the springs on centre, some designers have used short and well curved horns that are integral with the chassis frame side members. It has been found where the springs are attached to the chassis frame and that this, with some designs, brings the wheels well back, a condition not conductive to easy hadding because of the inability of the driver to see the wheels when seated above the most proposed.

Transmission Besign

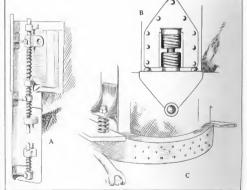
Realizing the stresses incidental to load carrying, designers have endeavored to guard against transmission failure by heavy constructions in the trucks of large capacity. In the Eckhard transmission the genred is a separate assembly of such proportions as to cause surprise with those who observe it, for the shafts are seemingly enormous and the gears are unusurlimate in diameter and in face width.

There is no question that they have unusual endurance and would probably withstand every strain that might be imposed. But to further insure against possibitity of damage when changing gears there is a second cone clutch between the transmission and the differential, which is disengaged with the clutch between the engine and the transmission, and a brake applied brings the gearset to a full stop before the ratio desired can be engaged. The gear teeth are coned so as to make possible engagement when the gears are idle and to minimize wear. If the clutch be disengaged and the machine moving, the gearset is stopped instantly when desired and every possibility of damage to the transmission is eliminated. The shaft hearings of the gearset are large and should endure under every possible condition of use. The transmission case is suspended at the front end by links at the ends of the arms of a broad yoke pivoted on the heavy cross member of the sub-frame, and is carried at the rear on a sub-frame cross member, so that, with the universal joint in the clutch shaft ahead of the transmission, there is small probability of misaligument of the driving system.

The Locomobile transmission case is in combination

with the differential housing and is a unit of unusual size. It appears to occupy a great deal of the space in the chassis frame and have weight that would seem unnecessary, but while it is a gearset that might be expected in a machine of much greater capacity examination of the sears and shafts shows that these should endure as long as any element of the truck. The case is bronze and very strong. It has two openings, one over the gearset and the other above the differential. The transmission shaft and countershaft are side by side and the gears and their condition can be determined almost at a glance. The differential is a continuation of the case and at either side is bolted the steel housitigs for the lackshafts, these containing the roller bearings close to the differential and the annular hall hearings at the outer ends. The housing of the jacksbaft is mounted on spherical bearings in cast steel brackets attached to the frame side members, so that the alignment of the jackshaft is not affected by the distortions of the frame, and the forward end of the transmission case is suspended by a boit that passes through a voke on the frame cross member and a lug at the end of the transmission case. The bottom of the transmission case is of atuminum and this may be removed, in much the same manner as the hottom of an engine case, for work on the shafts, bearings and gears.

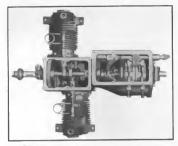
The case and the driving assembly need not be affected in any manner by the weight of a load or road shock and there is as near a three point suspension of the gearset and packshaft as may be found in any form of construction, there being a larger degree of vertical movement possible than would ever be necessary in so short a section of the chassis, and there is a reasonable degree of motion permitted by the jackshaft mounting. The upper section of transmission case carries the gearset and by dropping the lower part the clutch pinlon, countershaft or main shaft may be removed without disturbing any other components.



Details of Radintor Suspension: A. Combination Spring Support of Cooler and Handijor Tank in Sandusky Wag onst II, Vest and Substantial Federal Mountings C, Victor Simplicity and Protection by Perforated Frame Cross Member.

these all being attached to the case by collars. This transmission has four forward speeds and reverse, and the gears are with 1.5-inch face, of heat treated alloy steel, and cut

on a gear shaper to insure an accuracy that will minimize frictional losses. The countershaft gears are boited to the faces of flanges, cut from the solid metal forming the shaft.



The Init Power Plan) of the Mercary Delivery Wagon, as Onnoged Cylinder Engine and Planetary (corne).

With the Grabowsky design the transmission and the clutch are practically one assembly, the clutch being a dry multiple disc creation with seven driving and six driven discs. There is no universal joint between the two and the clutch is carried between the rear hearing of the engine and the forward bearing of the transmission. A sliding transverse bar operates the clutch, the thrust being taken by the thrust bearing ahead of the forward transmission bearing. With this transmission the countershaft is below the main transmission shaft. The assembly is exceedingly simple and the construction is such that the gearset ought to endure under the heaviest service for an indefinite period.

In the Mercury delivery wagon the motor and the transmission are in two housings and one assembly, the transmission case being boited to the engine casing. Hecause of the offset of the cylinders and the shape of the transmission bousing the unit appears irregular in form. By the removal of two cover plates the interiors of the casings may be examined or work performed, there seldom being occa-

sion to remove a part because of the extreme accessibility. This transmission is a planetary type with two forward speeds and reverse, the shaft being carried on heavy bearings. Simplicity and endurance are two of the qualities ciaimed for this construction.

Another transmission of unusual design is that installed in the Kochier delivery wagon, the case being of the barrel type with very bong end bearings for the shaft. The shaft is mounted on a third bearing at the centre of the case. The transmission takes the place of the customary jackshaft assembly and within the housing at the left is the planetary gearset which has two forward speeds and reverse. The clutch is a cone in which the metal.

chrome nickel steel and the steel shafts, hardened and ground, are mounted in phosphor bronze bearings of great

length in semi-steel casings. The transmission hands are extra width and are of semi-steet. The jackshaft and transmission case is so mounted in the chassis frame that the long bearings take the full load without side pressure leverage on the shafts.

Radiator Mounting.

With practically all motor wagons of good design the radiators are installed upon springs that are intended to absorb the strains from chassis distortion and to eliminate the vibration that attacks the thin metal and eventually causes fracture. The connections with the motors are usually of rubber hose of large section and as the principal stress would come from the movement of the frame the designers have as a rule made provision for protection through suspension on surings. One of the most interesting is that used with the Sandusky machines in which the radiator is on springs carried on brackets and guides, and these in turn carry other brackets and guides supporting the gasoline tank

The fadiators of Victor tracks are built with a bracket at either side in which a hole receives a boit anchored in the chassis frame, this bolt forming a guide for a short belical suring that resists all action. To prevent the heavy curved cross member of the frame in front of the radiator from reducing the radiation the member is perforated with three rows of holes. Into the reinfurced sides of the radiator frames of the Federal trucks, and carried on stout steel rods, are two short helical springs of large diameter, sensrated by a substantial lug. This is nest and finished in appearance. The White truck radiators are carried on shock absorbers that are cylinders of large diameter enclosing helical springs above pistons, the lower ends of the piston or plunger rods being attached to bolts set transversely in brackets on the chassis frame. The radiator is so hung that it may be moved slightly in any direction without any stress whatever upon it.

The Pope-Hartford radiator suspension is with long rods fixed to the chassis frame on a bracket and to the radiator at the top, there being helical springs at the top and bottom of the ruds with collars to retain the sorings. This design relieves the radiator of strain and allows a slight transverse movement. Somewhat similar is the method of mounting the radiator of the Sanford delivery wagon, in which rods are anchored in the charges frame and held by brackers on the dash at the top. At the top and bottom of the rods are «ciled springs that are slightly compressed between brack-



ranamission I onstructions: A, the Multiple Disc Cintch and the Sabstantial George) of the Grabowsky Track (B, the Combination Transmission Case and Jackshafi Housing of the Kochler Delivery Wagna.

surfaces are operated in a bath of oil. The gears are of ets on the radiator frame and effectually resist distortional action of the chassis

(To Be Continued)

Presented herewith is a general view of a Locomobile combination hose and chemical waxon, made by the Locomobile Company of America, Bridgeport, Conn., duplicates of which have been ternished to a large number of fire departments throughout the country. These have given splendid satisfaction under all conditions of service and are more or less well known in various sections.

The motor is a four-cylinder, water-cooled unit, of Locombile design, rated at 25 horsepower at 1250 revolutions a minute. The earburetor also is of the firm's own design, of the float feed type with single jet, and hot air connection with regulator. The fuel tank is with capacity as specified, up to 25 gallons, and is located on a superstructure behind or underneath the driver's seat. Feed is by gravity. Ignition is by high-tension dual system, magnoto and storage battery. Cooling is accomplished by a hone-comb radiator with gear driven centrifuga pump. Lubrication is by force feed oller, supplying oil under pressure to the nain bearings and keeping the level constant. Additional oil is furnished the bearings by collecting the sphash in cups cast in the bronze rankcase. The capacity is two gallons.

The transmission is four speed selective, housed in a bronze case. The clutch is a leather faced cone member of large dimensions with springs undermeath the leather to prevent gripping. Drive is by double chain. The frame is of alloy steel of highest tensile strength and e-lastic limit, heat treated. Springs are semi-elliptic, ct the finest alloy, two inches wide. The front members are 40 inches length and the rear 50. The front radie is of alloy steel, I beam section, solid Locomobile forging, heat treated, while the rear member is the same, the driving stresses being transmitted to the frame through strone distance rois. Kmergency brakes are expanding on spurcked drama attached to the raw wheels, carefully halanced and equalized. Service the rear wheels, carefully halanced and equalized. Service was sufficient to the rear wheels, carefully halanced and equalized. Service was sufficient to the rear wheels, carefully halanced and equalized.

Wheels are of the artillery type, 40 linches diameter, of selected second growth hickory, and run on annular his bearings, front and rear. The wheelbase is 148 linches. Three are of the bolfed-on type, heligt 40 h six linches, to conform and rear. The body is furnished in any design, to conform to the customer's specifications. The standard equipment includes two large acetylene headlights, combination oil and electric side and rear lamps, battery, horn, jack, tool bag, full kit of tools, and Prest O-Lite tank.

In July the working efficiency of the department in larafford, from, will be greatly increased by the addition of three Pope-liartford combination chemical and hose wagons and two new chief's cars of the same make, produced by the Pope Manufacturing Company of that city. Orders for these cars have been placed after a through trial of two Pope-liartford chemical engines and the deputy chief's wagon now in use.

Hartford's first Pope-Hartford apparatus was put into commission in June, 1910, and it proved so satisfactory that the second chemical earline and the runahout were purchased the following year. Now, besides placing the large reject order chronicled above, the fire board announces a plas for the complete motorization of the department within a year, thereby eliminating in a large measure an annual expense of \$12,000 for maintaining horses, which now do no actual fire fighting duty.

Among the other towns and cittes which have placed repeat orders for similar equipment with the Props Manufacturing Company may be mentioned the fullowing: Westeld, Mass., two; Swe Haven, Cons., four; Jerney City, N. J., three; Brockton, Mass., two; Middlerown, South Manchester, Bristol, Branford and Diabury. Conn.: Worcester, Pittafield, Mansfield and Junn, Mass. Passite, Bayonne, Keyrney, Park Rilge and Nutley, N. J.; Port Chester, N. Y.; Wilksbarer and Butter, Penn.; San Bernardino, Berkeley, Santa Rosa and Santa Barbara, Cal. Medford, Ore; Kanusas City, Mo., and Terre Haute, fid. Included in the list of cities now having apparatus manufactured by this concern are: Taunton and Northamplen, Mass; Rochester and Hastings-on-the-Hudson, N. Y., and Portamouth, N. H.

Chief S. W. Hunter of Springfield, O., has kept as accurate account of the cost of maintenance of the motor fire engine in his department and recently submitted a report to the mayor, covering the entire time since the vehicle was placed in commission. The apparatus has a 70 horsepower



Type of tocomobile Combination Hose and Chemical Wagon, Which Una Met with Decided Success in Numerous tastaliations

motor. Its speed is 60 miles an hour. It pumps 700 gal- fire. The driver's seat is heavily upholstered and divided long of water a minute and is louded with 1800 feet of 2.5inch cotton rubber hose, two three-gallon chemical fire extinguishers, one hard and one soft rubber suctions, one 20foot extension ladder and one 10-foot roof ladder, and six men. The machine was placed in service June 9, 1999 and the account follows:

Gasotine, grease, oil, 1989	\$15.7
Gasoline, utl. repairs, 1918	15.3
New tires and adjustments, 1919	2527
Gasoline, oil, repairs, 1911	107.5
New tires and adjustments, 1911	222.0
Total cost	\$695 ×
Total miles travelled	1.31
Total hours, engine pumped.	t
Total runs made	419

Although the Stegeman Motor Car Company, Milwaykee, Wis., has devoted its attention heretofore to the oroduction of industrial transports varying in load capacity from one to six tons, it is of interest to note that it has entered the fire apparatus field. An accompanying illustration presents the Stegeman fire insurance patrol wagon in service with the Milwankee Board of Fire Underwriters, and it is the second piece of motor driven equipment in that

city. The Stegeman patrol is constructed along truck lines, to withstand heavy service and the severe test of negotiating the unimproved roads in the outlying sections, which is the particular field of this vehicle. In order to effect the greatest safety and overcome the ever present danger to cars of this weight at high speed when rounding sharp turns or corners, the machine is designed with undersing springs. so as to secure a low centre of gravity. An additional factor along this line is the provision for a majority of the weight on the rear wheels. It is maintained that these work together in holding the car to the road in extreme bazards, preventing the danger of overturning and permitting more positive control by the driver,

The motor is of the four-cylinder vertical type, giving 50 horsepower by dynamometer test with

direct drive on high speed, or when travelling from 35 to 40 miles an hour. The drive is hy jackshaft to the rear wheels, through enclosed chains running in bath of inhricant. All operating parts are enclosed and run in oil or grease. Oil holes have been eliminated and juhrication throughout is furnished by large and positive grease cups. The frame is of pressed steel, reinforced with five cross sections and atrengthened by thrust rods between spring centres. mountings of the wheels are on ball hearings with a special thrust hearing to take up excessive side strains in making the necessary turns, so frequent with fire apparatus. The rear axie is of chrome nickel steel, guaranteed against breakage. The springs are semi-elliptic, front and rear, made of silico manganese steel, and also are guaranteed for life. Supplementary coll springs and shock absorbers take up all excessive spring action and all injurious rebound.

The body is constructed of welded steel, eliminating all rivets. Lockers are built on both sides with a through centre aisle. The cushions are fastened to the locker cover and when raised are automatically held in position to permit of quick removal of the 32 large canvas waterproof covers utilized by the crew in protecting property in time of into two compartments, one for the operator and the other for the captain. The duty of operating signals is delegated to the latter, jeaving the driver free in his control of the car. The gong is operated by the right hand and the siren horn through a lever depressed by the left foot.

A large acetylene searchlight is automatically lighted by electricity and the motor is equipped with a self-starting device, putting all of the mechanism into immediate control by automatic appliances. The tires are of the airless cushion type, with large dual equipment in the rear. The control is of the well known Stegeman design with left hand position of driver and right hand shifting levers

The patrol was placed in service in midwinter and was given an extreme test in climbing all the steep hills of the city through a deep fresh fall of snow, in which trial the low speed was never employed. It is stationed at house 2. Ninth and Calena streets, and covers the outlying sections of the north, east and west sides. Its squad includes eight

The board of fire wardens in Nantucket, Mass., has contracted with the Knex Automobile Company, Springfield, Mass., for a chemical engine, which is to be delivered to the



Fire tosurance Patrol Wagrol Wagon Mounted no Stegeman Chassis and in Service with the Board of Fire I aderwriters in Wilmankee, Wis,

call company of 10 men within three months. With its complete equipment the engine will weigh 6000 pounds. It will be driven by a four-cylinder motor of 50 horsepower. and will be equipped with all the latest fire fighting features.

The city council of Trinldad, Col., has ordered the immediate purchase of an automobile fire truck at a cost approximating \$5one.

The fire commissioners of Southington, Conn., have placed an order with the Knox Automobile Company, Springfield, Mass., for a combination chemical and hose wagon, to be delivered in August.

The board of aldermen in Nashua, N. H., is considering an appropriation of \$6000 for the purchase of automobile equipment.

The fire department in Hoboken, N. J., has ordered a 30 horsepower American car, made by the American Motors Company, Indianapolls, Ind., for the use of Chief Dunn. Seem years ago the lietroit fire department purchased two friction driven Cartercars, made by the Cartercar Company, Pontiac, Mich., for the use of its deputy chiefs. These machines gave such satisfaction that the number has been increased to seven, the order for five more having been given only recently. The original Cartercars are still running and are in active service daily.

The city of Pawtucket, R. i., has appropriated \$7500 for the purchase of motor fire apparatus to replace that now stationed at house 1, which is to be transferred to South Woodlawn.

Mayor P. W. Ciement of Rutinnd, Vt., has laid before the city council a resolution appropriating at least \$5000 for the purchase of automobile fire equipment.

As is well known the city of Birmingham, Ala, is deepple interested in motor fire fighting apparatus, having decided to replace all of its horse draws equipment. During the first month the present 14 pieces of automobile apparatus were in service the cost proved a welcome surprise to the officials, being set forb in the following table:

		Hlocks				
	No. of Jarms	Trav-	Cals. Fuel	Gals. Oil	Lbs	Tota
Hose L	. 45	578	55 a	1.00	25	\$5.x
Hose 2	. 50	930	35.0	2.12	.25	6.7
Hose 3	. 32	540	35.5	8.1	1 00	3.1
Engine 3	. 21	325	46 0	2 25	1 1119	6.5
Hose 4	. 32	434	30.0	2.50	1.00	5.1
Hose 5.	. 13	219	15.0	1.00		2 4
Hose 6	. 29	360	35.0	1.75	7.5	3.0
Hose 9	. 6	105	35.0	1.25	1.25	3.4
Hose 10	. 12	182	54.0	3.12	.75	6.3
Engine tt		760	61.0	2.54		6.4
Hose 12	. 4	5.2	30.0	50	21.0%	3.3
Engine 13	. 6	76	N 0	.50		.51
Hose 16	. 9	176	10.5	1.00	.12	1.1
Itose 19	. 5	66	10.0	7.8		9.7

The 14 pieces answered 144 alarms, practised 39 hours, traversed 4755 blocks, used 369 gallons of tabeliating oil, eight pounds of pressure greese, changed two Prest-O-Lite tanks, replaced 24 dry cell hatteries, one spark plus and one gas burner, at a total cost of \$63.72, an average of ahout \$4,50 for the upkeep of each machine. Of course this does not include interest on the investment, depreciation or tires. However, when it is remembered that the cost of horses for the 14 pieces of apparatus which these replaced averaged \$4.50 a month, without counting the accidents to horses, me and machines, the difference in favor of the automobiles is quite marked, to say the least.

Through the efforts of the municipal committee of the Board of Trade in Philadelphia, \$41,000 has been piaced at the disposal of the department for the purchase of automobile equipment. George D. Porter, director of public safe-ty, and Chief Waters of the fire department are engaced upon the work of preparing the specifications, and it is understood that the vehicles will be equipped with life saving devices and fire fighting appliances, and constitute what will be termed a "Plying Squadron."

Recently, one of the citizens of New York City criticised the department for the purchase of the gasoline pumping engine which has been in service for some months past. in reply Fire Commissioner Johnson says:

"I agree that the pumping efficiency of the new gasoline pumping engine is not all that it might be or will be. Engine 35 is capable of pumping 744 gailons of water a minute, or ahout as much as a second size steam engine. A first size steam engine will pump 906 gallons a minute, The cost of engine 39 was \$10,000. A steam engine costs \$5600 "If this were all there is to it, there would be no room for argument, but there is more. When we buy a steam engine we have to buy three horses at \$35.0 each. The upkeep of each horse is \$36.0 a year, or \$1000 for the three. An engine driver costs is \$14.00, and an engineer \$1300. Therefore a new engine costs us \$10,130 for the first year. The following years it costs \$13.00 without cost of repairs or

"Automobile fire engine 39 cost us \$10,000. A driver, who also attends to the gasoline pump, draws a salary of \$1800. Gasoline and repairs cost us \$200. Therefore, as eagine of this type stands us about \$11,800 the first year and \$1800 each succeeding year."

Nowich, Conn., has followed the example set by other progressive cities in installing a piece of motor propelled fire apparatus which is a combination hose and chemical wagon made by the Pope Manufacturing Company, Hartford, Conn. The body is aftered with sears running learned wise and arcommodates eight men. The equipment consists of 1000 feet of 2.3-inch water hose and a chemical tank of 35 gailons capacity which is located under the driver's seat. The hose is carried in a metal basket having a capacity for 250 feet. Ladders, axes, etc., complete the equipment.

Marboro, Mass., is considering motor propelled fire apparatus and President Bourdreau is using his influence to contince the members of the board of aldermen that the automobile would not only vastly increase the efficiency of the department but it would save the town at least \$130 a year. The sentiment of the representative business met is in favor of the change from the horse drawn equipment.

The following cities and towns have made appropriations for or are considering the purchase of motor propelled for apparatus: Rellingham, Wash.; Mijwaukee, Orc.; Port Huron, Mich.; Terre Haute, ind.; Freeport, Ill.; North Vancouver, B. C., Canada; Brainree, Mass.; Yougstown, O.; Lynn, Mass.; La Grande, Orc.; Arlinston, Mass.; Macoo, G.; Kiwe, Brunawick, N. J.; Montjeller, V.; Pasaden, Cal.; Milwaukee, Whs.; Shelton, Conn.; Petaluma, Cal.; Portsmouth, N. H.; Passsike, N. J.; Tennalitytown, D. C.; Canton, O.; Visalia, Cal.; Barre, V.; Portland, Orc.; New Britain, Conn.; Racine, Wis, Sloux City, Ia.; Andower, Mass.; Reading, Mass.; Columbus, O.; West Springfeld, Mass.; Plymouth, Ind.; Milton, Penn.; Pittsheid, Mass.

Newburyport, Mass, desires the automobile to replace lis horse draw fire equipment, but the News of that dry comments editorially as follows: "If the city of Newburyport is to purchase automobile fire apparatus it is aboud do so only after there is a sale of some of the equipment are in service. A city of the size of Newburyport which has four englies in commission is a rare one and has equipment sufficient to cope with any usual conflagration sad most unusual ones. To spend money to add to this equipment, while all this is to be retained and the department kept up to list present size, would be waste. Let us kept the department in splendid shape, but let's not go cray about it. A place of automobile apparatus would be a fast bing, but it is should come only in place of a redardin lis other lines, and not in addition to what we already have."

Doubless there are other towns and cities which everpy a position similar to that of Newburyport, but the economic principles involved should be taken into consideration, as it has been proven time and again that automobile Psi paratus means a saving of several hundred dollars a year over the horse drawn equipment, to say nothing of the reduction in five losses due to the speed of the machine. The question of insurance rates is also worth consideration.

KNOX AMBULANCE FOR EXPORT.

A sambulance possessing many excellent features of construction and equipment and which is and to be the most perfectly appointed ever built in this country, has been completed by the Knox Antomobile Company, Striksfield, Mans, for foreign silipment. The demands for modern hospital practise require ambulances fitted with all possible conveniences as It has been demonstrated that prompt attention to the condition of the patient while en route to the hospital is an important factor in effecting recovery, and the latest Knox vehicle has been designed to fulful all these resultements.

In the illustration herewith is presented the ambulance, with chassis of siandard Knox construction throughout, being equipped with a four-cylinder, four-cycle, water-cooled motor, rared at 40 horsepower. The wheelbase is 134 laches and the wheels are equipped with 38 by 5.5-inch paeamatic three single in front and dual at the rear. These wheels are horse with long semi-elliptic springs on the rear, pro-vide extremely confortable relinding qualities.

The body is unique because of its design and appointments. The frame is of carefully selected ash, strongly braced to insure lightness with strength and freedom from

squeaking or rattling. Sheet aluminum is utilized as the outside covering, and this is made in seamless panels, while the inside is sheathed with three-ply laminated white wood. The flooring is of ash, covered with linoleum.

Back of the driver's seat the body is divided into two compartments, the forward end having a door at either side, also a folding seat facing forward for the doctor's nee This compartment serves as a side entrance or a passage way for the rear compartment and opens directly into the latter without intervening door. Directly behind a partition at one side of the vehicle are located two cots, one above the other, supported by springs. Each cot is of the folding type, adjustable to any angle, and is supported

by a metal slidable tray into which it moves readily. Below the lower cot is a large locker for the convenient storage of medicines, etc.

Two folding seats are provided on the side opposite the core, one at the head and the hader at tile ford, and lextween core, one the head and the hader at tile ford, and lextween them, on the side of the body, is arranged a next folding hot and cold water outlit with sids and destance tile leading to the control of the care. A small alcohol ismy services the patient in the control of the care while on the way to secure the patient in addition to these arrangements, there is a large Thermos over an antiseptle tray and pad, while drinking cups are also everyded in a convenient bracker.

Ample ventilation is furnished by three shutter ventilators on each side, under the roof, while additional cutmay be secured by drapping the windows in the doors. As window on the side opposite the core, combined with conin the doors, affords excellent light, and double doors at the errar provide ample space for entrance and exit.

The interior of the body is finished in pure white enamel, presenting a particularly clean and sanitary appearance, while the exterior is also white with a fine gold stripe. For night use the entire car is lighted by electricity, current for

the two large done lamps being supplied by a dynamo driven by the motor. Storage batteries supply electricity when the motor is not operating and these are automatically charged by the generator. Every modern convenience for the comfort and care of a patient has been installed in this ambulance.

WORKING FOR A BUS LINE.

The Commercial Club of Fort Dodge, Ia, is working carnestly for the establishment of a motor 'bus line and at a recent meeting a committee was appointed to solicit funds for the new project. An active campaign is in progress and the club expects to secure the line in a short time.

SELECTS SAMPSON TRUCK.

G. L. Summey, which engineer of the Chase Rolling Mills Company, Waterbury, Conn., said to be one of the largest brass manufacturing concerns in the world, has been investigating motor trucks for a number of years. In fact, it may be stated that the Chase-company was one of the first con-



New and Richly Appointed Ambiliance Countrarted by the Knox Automobile Company, Apringdeld, Mass, for Service Abroad—It is Pitted with Modern Conveniences for Care of Pattents and in Luganosity Essay Riding,

eerns in Waterbury to test commercial vehicles, Its factory commercial vehicles, Its factory to be a long shift, reached over vittfield brick pavements from the centre of the city, and the problem of a hauling by horses is by no means easy of solution. After several time in investigating some \$5000 and three years' time in investigating not be a long to the commercial time and the commercial time and the commercial time. Also of a Sampson, made by the Alden Sampson Maintfacturing Commany, betroit.

REPRESENTS REMY IN CANADA.

Taylor & Arnold, I.bd., of Winnipeg and Mentreal, Can, one of the largest railway supply houses in the Dominion, has become the sole representative of the Remy Electric Company, Anderson, Ind., maker of Remy magnetos. The various branches maintained by this concern will be sufficed as scribe stations for the Remy products, as well as distributing and selling points.

W. 8. Hathaway of Kansas City, Mo., has organized the Southwest Motor Company, which will represent Reo trucks, made by the Reo Motor Truck Company, Lansing, Mich., in that section at 1515-1518 Grand avenue.



Marzaday Google

FEATURES OF ADAMS CONSTRUCTION.

SIMPLICITY of construction, and consequently of operation, has the effect of an axiom with the Adams itroCompany, Finday, O., in the production of the Adams onetion truck. Complexity of parts is held to mean connected
cost of upkeep and needless necessity for repairs and replacements. With the object in view of keeping the cost of
operation and maintenance to a minimum, the Adams chassis has been built with as few working parts as careful design and extended experimentation have demonstrated is
possible. There is claimed to be little chance that parts
will become deranged because of circless driving, but respradless of this, all components have been designed and
built interchangeable, being constructed by special machinery and from the best material obtainable.

The Adams Bros. Company built successful machinery over 40 years ago. In colineering, foundry and machine tractise it has held front rank. Its decision to enter the commercial whelice field was made after through consideration of the needs, and the Adams truck was conceived with the specific idea of measuring up to the high standard set is beld to eliminate entirely all danger of casual injury, and at the same time makes for added accessibility, in that the hood is hinged at the tep of the radiator so as to be lifted from the front, exposing the entire power plant for work or removal.

After careful consideration of the matter of driver's location, it has been devided to place the steering wheel at the left. This not only provides for easy access to the seat from the sidewalk or curb without passing around the truck but is held to make for more satisfactory operation in consecuted traffic. The control levers are placed in the centre of the floor boards, adding still another feature of simplicity and accessibility.

The motor is a four-sylinder, four-cycle, water-cooled unit with hore of 3.875 Inches and stroke of five, rated at 30 horse-power. The cylinders are cast en bloc of a very bigb grade material, and liberal provision has been made for ample water circulation between each cylinder. Pistons are of a special grade of cast iron, accurately ground and fitted with piston rings of the same material, ground on all



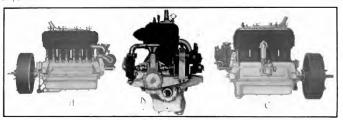
Adama One-Ton Truck: A, Side View of Chassis; B, Benr View of Chassis, Showing Axic Construction and Spring Suspension;
C. Standard Express Body; D. Special Delivery Body with Removable Panel; E, Fitted as a Clab Tine.

by the other products of the concern. Each component is constructed to perform its particular duty and to work in complete harmony with every other part and plece as a perfected whole.

One feature cannot be emphasized too stronkly. The Adams truck is not an assembled whelice, but is constructed throughout in the factory of the Adams Bros. Company, Everything from the motor and radiator back to the rear azile is the product of this concern in its own shops. The various components have been subjected to the most rigid tests and the finished product is thoroughly tried out under every road couldino before being placed upon the market. As a result, the Adams one-ton truck not only represents simplicity of construction, but inherent reliability, which is backed by a substantial guarantee covering a period of one year from the date of delivery.

Something may be said of appearance, and in this respect the maker claims originality of design and careful attention to detail. Accessibility is another important factor, and with this in mind, the water pump, oil pump and gauges, carburetor, magneto, oil filling fannel and breathing tube have been so placed as to be reached easily. The radiator is situated behind the engine, following foreign practise, and is readily filled from either side. This location working sides. The crankshaft is drop forged of 3.5 percent, nicked sized. It has large diameter and unusual length of bearing journals, with three bearings of a special composition insuring excellent service. The cambant is also drop forged with integral cams, being entirely enclosed in the upper half of the crankcase and actuated by means of spiral gears. All valves are mechanically operated and interchangeable. They are of liberal diameter and located on the right side of the motor.

The crankcase is made of the finest grade of aluminum alloy, and is so designed that the upper half contains all the working components comprising the motor, while the lower half constitues the old reservoir supplying the lubricant to all working parts. The lubrication system is so arranged as to offer the combined advantages of the constant level splash and force feed systems. Positive water circulation is effected by a spiral gear driven centrifugal pump, aided by a fan located in the flywheel. The radiator is of the vertical tube type, provided with two filling caps, one on either side, and is carried at the rear of the motor on fietble supports. This location is held not only to proceed the member from possible collisions, but the mounting is such as to eliminate any damage emanating from the unequal motions to which the side ratio of the frame are



Three Views of the Adams Motors A, Left Side, Showing Exhaust Munifold and Valve Arrangements B, Front, Presenting Location of Magneto, Water Pump and Oil Fillers C, Hight, Indicating Position of Carbaretor and Inlet Manifold,

Ignition is by dual system, employing an Elsemann high-tension magneto. Stereing is a complished by an irreversible screw and int littisfer type post located on the left, permitting a clear view of the road in either direction. The spark and throttle control is mounted on the steering wheel, and with the location of magneto and carburetor, all councerliens between those and the steering post are established directly by two straight road, doing away entirely

necessarily subjected in traversing rough roads.

connections between those and the steering past are established directly by two straight rods, doing away entirely with the intricate network of numerous connecting rads, bell cranks and levers. The earthervier, which is a Kinston, is also controlled by pedia. The arrangement and location of magnetic, water pump, filling framed and oil gauge that the pedia of the pedia of the motor by simply lifting the bond, and this may be removed without disturbing any other adjoining part.

The clutch is a Wells expanding disc member, so de-

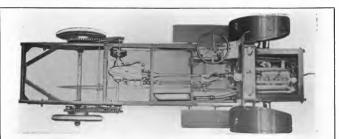
signed as to permit of easy emagacinent, and it is claimed that the car will pick up smoothly without undue strain on the transmission, acte or other driving pairs. The transmission is of the selective type, providing three speeds forward and reverse, direct drive being on the high. This is located in the centre of the rar and connected with the clutch by the driving shaft and universal pinus which take up all variation in aitmment, resulting in traversing rough roads. All working shafts are of special alloy seed. Final drive is by double side chain, having 1.25-inch pitch and 56-inch roller.

Brakes are three in number, one service member on

the Jackshaft, operated by pedal, and two emergency members on the rear wheels, operated by hand lever. The levera are located in the centre, where they are operated in a natural manner by the directs rights hand. The frame is of the special high grade pressed steel, 38.75 inches wide, offset see between the front tweets by a generous 1° section. The native are of Sheldon manufacture, of special design for most satisfactory service under the sectors; conditions. Springs are semi-elliptic, front and rear, the former being such that the semi-distribution of the section of the services of the section of the section of the section of the section of titlery type 3° inches diameter, fitted with the clinch solid titlers in front and 3.5-inch in the rear. The wheelbase in 121 linches and the read 5°.

Any standard body is fitted, and the e-mpany is prepared to build any type of several engineeria as desired. Accompanying photographs give some Indication of the special bodies which have been produced for varying classes of work. The regulation loading stations has an inside measurement of eight feet to Inches length by three feet by Inches width. The standard olor is buttlengh gray, ablicush the palming its optional. With the machines are furnished two electric and oil side Image and tail lamp, full set of tools, Jack and horn. The gasoline tank has capacity of 15 aclions.

The Adams Bros. Company is confident that it has met every requirement in simplicity, stability, efficiency and appearance. In making sales, every care is taken to provide a vehicle and body suited to the particular needs of the intividual case.



Pine View of Adams One-Ton Chassis, Indicating Simplicity of Design and the Limited Number of Working Paris,

NEW FREIGHTERS IN PORTO RICO.

Systematic Attempt to Solve the Problem of Long Distance Haulage, in Which Industrial Transports Will Compete Actively with Railroad Service.

By R. W. Hutchinson, Jr.

W.HILE the motor truck has been regarded mainly as a freight carrying institution satisfate for city service, it is of interest to note that it has proven irself of greater efficiency than the railrond for certain conditions of moderate distance basilage. That such a radical step has been taken by a large general trucking corporation on the Island of Porto Rice, utilizing industrial transports for hundard that can be considered in the long distance class, industive very foreibly the degree of dependability which can now be placed in the first class commercial vehicle. That the motor truck has proven itself adaptable under the most extreme conditions of climate and roads also indicates that the "new freighters" can no longer be regarded as machines for service only on heely paved street

One of the largest installations of motor trucks for general transportation service has just been made by the international Motor Company, New York City, maker of Mack, Saurer and Hewitt vehicles, with the Porto Rico Motor Company, which has bought 30 Saurer cars. Before and this is the only branch of importance reaching the interfor, with the possible exception of the Vaidez road be exeen Catano and Bayamon. Along the east coast of the island there are several separate railroads owned by the Suxar Centrais, and used for hauting cane. It seems probable that at some later date these separate railroads will form a part of the general system, extending all the way around the island.

The main ports are San Juan and Arecibe on the northshore, Ponce and Arrayoc on the south shore and Mayagers and Aguadilia on the west. There are certain minor ports, such as Fajardo Playa, Ilumacao Playa, Aguirre and Guanica. There are no land locked harbors on the island, with the exception of San Juan, Aguirre and Guanic; all of the other points used as ports are open roadstela. When ships are discharged or loaded in these latter, it is necessary to use lighters and other vessels which maintain a constwise shipping service.

The transportation of freight between the coast and



The First Installment of the Thirty Source Curs Recently Shipped by the International Motor Company for Freight Service.

the order was placed, the traffic department of the International company studied the conditions in Porto Rico at close, range. The selection was made after an investigation of a number of makes of trucks and the decision was reached after a thorough knowledge of one of the most serious factors against the need such vehicles under road conditions as severe as those which exist on that island, that of the troubles. Every time of transportation cost was charted and not the smallest detail was neglected in predetermining the literativeness of the enterprise.

The Island of Porto Rico has a population approximating 1,114,000, and a total area of 3600 square miles. The people are distributed generally all over the Island with the largest cities and towns near the coast. The density of population is greater than that of any other auto-division of American territory, with the exception of Rhode Island, Masaachusetts and New Jersey. The Island is divided into 66 muskipalities, and the licoming supplies and outgoing products pass through the principal towns.

The chief transportation system is the American Railroad of Porto Rico and certain aillied railroads. This laa narrow gauge line extending along the coast from Carolisa, east of San Juan on the borth coast, around the west and of the island and along the south coast to Guayama. A branch of this swatem extends from San Juan to Carnas. the interior is at present carried on almost entirely by means of bull carts, and the service siven by the railroad is so unsatisfactory, particularly with regard to the shipments of less than carload lots, that bull carts are competing with the railroad on roads parallel to their lines. The business of the island is increasing at a rate vary-

ing from 16 to 20 her cent. a year, as shown by the reports of the customs service, and the need of an adequate system of transportation is becoming more and more imperative, especially between the coast and the interior. There is a wide variation in the rates charged for transportation by built earts, this being from 15 to 40 cents a ton-mile. The number of cattle on the island is diminishing and as more land passes under cultivation the pasturage for cattle is decreasing. The grades in the literior prohibit the construction of railroads through this section for a long period, If at all.

So Imperative has become the necessity for additional means of transportation that some American mules have been imported. These are used only to a very limited extent, however. There are a present about 45 motor tracks on the island, and approximately one-third of these are of the first class. These are usually owned in loss of one to three by individuals, aithough there are two or three automobile truck connealies. In general, it may be said that

-Superintend Foreman For

Niet

Clerk

Bayama

with the exception of the Atias Transfer Company, which is operating from six to eight trucks in the immediate vicinity of San Juan, no attempt has been made to install an automobile truck system along anything like broad lines. previous to that described herein.

The lands on which coffee, tobacco and a portion of the sugar are raised are in the interior of the island and the principal use for an automobile would be in carrying provisions and mechandise into the interior and bringing out these products. The movement of provisions and merchandisc toward the interior towns is comparatively steady, with a somewhat larger volume in January than in other months of the year. One feature of this movement is quite pronounced, in that the bulk of these goods come from the coast cities, such as San Juan, Ponce, Guayama and Arecibo. The reason for this is found in the fact that the merchants in these cities are in a better position to give credit than are those of the towns of the second grade.

The roads of the Island are divided under two systems, one known as the insular, which penetrates most of the important sections and which in a few years will form a very complete network, and that known as the municipal. The first is under the care of the insular or federal government and is a magnificent system of macadamized roads ployees of the company will be American, as follows: 41 ----- M. ----

	deneral	Manager		
ent, Sa	n Juan-	Super	intendent,	Ponce-
enun guar	Foreman San Juan	Foreman Ponce	Foreman Guayama	Foreman Arecibo
nograpi	ier c	senier and	t'aymaster	

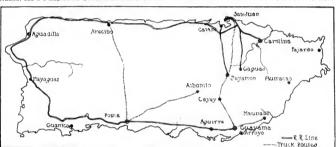
Stenovranher

339

Conditions are such that the trucks will be required to operate over roads running through mountainous country. The maximum limit guaranteed by the government for the bridges on the routes is eight tons for one vehicle. The type of freight is such that 10,000 pounds can be handled properly by a stake body 12 feet long, six feet wide and six feet high. A truck to be successful under these condimust be designed particularly for mountain work.

The Saurer truck of five tons capacity fulfills all of these conditions, and is particularly suitable for this proposition. The motor air brakes with which this vehicle is equipped are a decidedly valuable feature in this country. The light weight of the chasais insures the most economical results in tire maintenance.

in connection with this last item, it has been found



Map of Parto Rico, indicating Present Railroad Pacilities and Cities Which Will be Served by New Motor Truck System

with grades seldom more than seven or eight per cent., and in no case exceeding 15. The second consists of ordinary dirt roads, maintained by the different municipalities, or local governments, and forming connecting links between the insular roads. A great many of these are practical for motor trucks, except during the season of heavy rains,

which occurs between Sept. i and Dec. I. It is not proposed that the automobile truck system to be used by the Porto Rico Motor Company shall operate over the municipal roads except in special instances, but it is proposed to operate these trucks over the insular roads, which now touch, or will very shortly touch all of the main towns. The system may be considered as having been separated into six divisions as follows: Division 1, San Juan-Cayey; 2, Bayamon; 3, Ponce-Albonito; 4, Ponce-Arecibo; 5, Guayama-Cayey; 6, Guayama-Maunabo. The points at which garages are required are San Juan, Caguas, Ponce, Arecibo and Guavama.

The organization of the company operating this system is to be along the lines of the diagram presented below. The cierks, stenographers and one of the machinists in each of the shops at San Juan and Ponce will be Porto Ricans, while the officers and the remainder of the emthat on automobiles operating in Porto Rico the costs are exceedingly high for reasons which are not thoroughly understood. A certain tire company, however, stated that it would be willing positively to guarantee its product for the minimum of 5000 miles of travel on the island, and that users of its tires will be given the benefit of a hetter guarantee if it is found that this figure can be increased.

The transportation system, which adequately provides for the needs of the territory now under consideration, eventually will control practically all of the interior traffic of the Island. Twice as many trucks as those ordered for the initial installation will be needed in the future, and possibly three times as many.

The greatest volume of traffic is found in the central portion of the island. For these reasons it was recommended that the initial installation be confined to that section between San Juan, Guayama, Ponce and Arccibo, as mentioned before. It will be noted that no provision has been made for operating trucks in the neighborhood of Manati, Ciaies and Morobis, for the reason that all hauling to and from Manatl and Vega Baja is done by railroad and the road between Manati and Vega Aita is not yet completed. This section will be considered later.

New Emmercial ar Accessories.

Cooper Valve Lifter,

A new type of valve litter which presents several practical features has been brought out by John J. Couper, Providence, R. 1. It consists of two parts, a U shaped member carrying a hinged lug into which is threaded a serve member, and a lever. The lower end of the former is recessed to fit and engage the slotted portion of the lever. The latter is slightly curved and is equipped with titling shoes which engage with the retaining mechanism of the valve spring. The upper surface of the lever has a series of notches, these being for the purpose of engaging a brace member which is attached to the handle and so arranged that when the valve spring is compressed the brace slips into place and automatically locks the tool in position, allowing the operator the use of the hands in removing or replacing the retaining mechanism of the valve.

Ellis Fuet Purifier.

The Ellia gasoline purifier, for which the L. P. Rhines Company, Boston, is special agent, is a device for incorporation in the fuel line between the tank and the carburetor. It is simply constructed and the maker states that not only is the fuel purified but fine particles of kerosene, dirt, etc., are absolutely prevented from reaching the vaporizer. The fuel first enters the precipitation chamber, then is filtered through two fine screens, two felts and quartz, whereby foreign elements are retained. Any water in the gasoline lodges in a separate chamber while the fuel rises and passes through the filter to the carburetor. The device is easily drained of the impurities caught by turning a small thumb screw. It is compact, weighs about six ounces and is constructed of an aluminum composition. It comes complete, including brass unions, and these are made in three Sizes

All in One Wrench.

Combination wrenches appeal to operators who do not like to carry a large number of tools in the kit. The Universal Wrench Company, Indianapolis, Ind., is marketing a novel device which it is claimed will perform the work of numerous tools. The laws of the wrench are adjustable and so constructed that they may be employed for removing nuts or working on piping. Eight different angles may be secared as well as ratcheting in either direction. The tool is nine inches long, constructed of high grade steel and guaranteed.

Macdonald Tire Chain Tool.

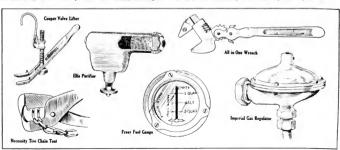
The Necessity tire chain tool, manufactured by J. N. Macdonald & Co., Wethersneld, Conn., and for which T. F. Russell & Co., Hoston, is distributer, is a device for repairing tire chains. The jaws of the instrument are so constructed that the booked ends of the chain links may be forced apart and compressed easily, and it is claimed by the maker that renairs may be effected in a very short time.

Freer Gasoline Gauge,

The Preer gauge manufactured by the Tanner Gage Company, Akron, O., is designed to register the amount of fuel in any type of tank and consists of a reading dial network of the tensor of the second of the second of the second of the tensor of the second of the tensor of the second of the second

Imperial Pressure Reducer.

The imperial Brase Mennfacturing Company, Chicago, bas brought out a new device designed to reduce the pressure of acetylene when utilized from a tank. It is incorporated in the line between the container and iamps and the pressure of the gas is automatically regulated and mayare the reduced as low as two ounces. It is claimed by maker that a steady and even flow of gas is assured and that condideable economy is effected by the use of the device. It is compact, constructed of bith grade materials and in addition to being attached easily, is bexpensive.



Some New and Practical Accessories Which Will Appeal to the Operator, Owner and Manufacturer of Commercial Vehicles, Including Valve Lifter, Fuel Filter, Gasoline Gauge, Etc.

MOTORS IN GERMAN ARMY.

It is stated that the German arity new his 600 motor outfits, each comprising a tractor and trailor, having a total carrying capacity of six tons. This is estimated to be sufficient for the supply of rations and forage to at least 10 divisions at the rate of 80 tons a day.

The Austrians are subsidizing similar outfits, but in view of the more undulating nature of the country there, each is intended to carry but five tons. This government recently conducted a very successful 1000-kilonieter trial, in which 10 of these motors took part.

G. M. C. AND GOLD DUST TWINS.

Housekeepers throughout the country are familiar with the Gold Duat Twins, a product of N. K. Pairbanks & Co., Chicago, which concern utilizes the 3.5-ton G. M. C., truck, made by the General Motors Track Company, Betroit, Illiast trated berewith. It will be noted that the machine is not only used for hauling, but it provides a valuable advertising medium, its aides having two panels on which are outlined the products of the commany.

The machine is propelled by a four-cylined, four-cycle, watercooled motor, having a five-inch bore and stroke and rated at 40 horsepower. The power plant is demountable. Cooling is by cellular radiator and Ignition is double, with two sets of plugs. current being furnished by a Meamagneto and storage batterles, A ball type speed governor is fitted to prevent the operator from overspeeding the vehicle. A dlsc clutch is employed and the transmission is of the progressive type. affording three speeds forward and reverse. Final drive is by side chains.

Two sets of brakes are fitted, these being of the expanding and contracting type on the rear wheels, which are equipped with 36 by four linch dual solid tires. The front members are fitted with 36 by five-inch sinche solid tires. Semi-ciliptic springs are employed in front and full platform at rear.

The wheelbase is 138 inches. The driver's position is at the right with right hand control. The body is of the stake platform type with curtains, and the driver is fully protected against the weather by a cab.

AMERICAN TIRES IN EUROPE.

It is claimed that while Europe has been producing automobile tires for a number of years, the rubber trend type of non-skid pneumatics, so prevalent in America, is practically unknown there, except as it has been introduced by tourists from this country. That there is a demand for this type of tire is evidenced by the fact that several Continential dealers are seeking for ascenice. One of these dealers, M. Adier of Amsterdam, Itoliand, was a recent visitor in this country and spent some time looking over the tire field. As a result of bis investigations has taken the agency for United States tires, made by the United States Tire Company, New York City.

Mr. Adler operates one of the largest automobile supply houses in Europe, the main store being located in Amsterdam and brauches in Paris, Brussels and Birmingham, England. He will handle the entire United States line, including the new patented truck tire. In making his decision he absolutely disregarded the question of price, giving special beed to quality. He claims that while American tires cost more than the European product, the difference in price will be more than offset by the difference in service.

SANITATION AND HORSES.

According to Morris Grabowsky, sales manager of the Aiden Sampson Manufacturing Company, Detroit, make of the Sampson line and a constituent of the United States More tor Company, New York City, sanitary conditions would be improved greatly by a more extended use of the motor truck. He says:

"Statistics credit the cities of this country with using 4,500,000 bross and 200,400 mules. With all the presentations to keep the cities sanitary little progress can be made so long as such an army of quadrupeds parades in ending procession up and down the streets. The clouds of dust which sift above the payements are not clean earth of teen seath of



Semi-elliptic springs are employed G. M. C. 3.5-Ton Truck I tillised by N. K. Pairbanks A Co., Chicago, the Vehicle Serving as in front and full platform at rear a Nationale Advertising Medium as Well.

fields, but are filled with disease germs and lingering death.

The expulsion of the horse would mean the disappearance of the house fix, by removing its chief breeding source."

VELIES SUCCEED HORSES.

It is surprising to note the number of teaming concerns operating from 180 to 200 horses in Chicago, who are pipleting orders for contract work. It appears that many of these companies have been a little skeytical about the operating costs of the two and three-ton trucks, but the Zipprich Teaming Compans, one of the largest in the city, recently placed an order with the Velle Chicago Branch for a three-ton Velle, which will be devoted to caring for the work of Hart, Schaffner & Marx, the well known clothing maker.

R. T. Houk, for the past year connected with the sales end of the United States Motor Company, has resigned to assume the management of a large mill in Ohio, in which he has been interested for some time.

TRUCK NOTES OF INTE

COMPETING WITH RAILROADS

The recent coal strike in Great Britain served to recall the subject of long distance motor haulage, and the results which were obtained during the railway strike of last August. It is probable that the business men of England could not have secured a better demonstration of the value of industrial transports than during that period, and it is interesting to note that several sections of the Itritish Isles are profiting by the experience gained at that time

In Glasgow the demand for some new method of transportation has been very real, due to the fact that railway facilities in that portion of the country have been reduced to a minimum. The Glasgow Motor Carriers, a haulage company operating a considerable number of Halley vehicles, is engaged in the cartage of coment from that city to the Partick. It also hamls beer to Motherwell, a distance of some 12 miles: machinery to Wishaw, about 15 miles: stoves from Itomybridge to Glasgow, and undertakes considerable other work of this character.



First Fire Desartment Ambulance Recently Installed to Berlin, Germany, The same thing is true in a measure of Edinburgh, thing to learn in ambulance construction. where the Scottish Motor Traction Company often is called upon to make trips between that city and Glasgow, a distance of 37 miles. Some attempt has been made to inaugurate similar service in different sections of Engiand.

KISSELKAR IN JAMAICA.

A member of a large firm dealing in bananas in Jamaica recently returned from Baitimore, Md., bringing with him a three-ton KisselKar truck, made by the Kissel Motor Car Company, Hartford, Wis. This is said to be the first motor vehicle utilized in this work on the island, and the results were so satisfactory that a reneat order for two more machines of the same make has been forwarded to the United States. Other growers are considering the advisability of experimenting with commercial cars, and it is understood that American makers are to find decided competition from British products in the near future, one machine of English make having been ordered already.

MAIL MOTORS IN NEW ZEALAND

Buring the past five years the New Zealand government has been employing Aibion vehicles, made in England, to good advantage in connection with public service and mail contracting work. So satisfactory have these machines proven that a repeat order has been given for a two-ton vehicle which will be used exclusively in mail delivery.

GERMAN FIRE AMBULANCE.

The accompanying illustrations present the type of mofor ambulance recently installed by the fire department in Berlin, Germany. This is the first vehicle of this character in service with a fire department in Germany, and it will answer all alarms, in exactly the same manner as any other piece of fire lighting apparatus. The object, of course, is to provide for the needs of the injured in a possible emergenev

it will be noted that the chassis follows standard lines

and is equipped with pneumatic tires of liberal dimensions, thus affording easy riding qualities. The end view shows the interior. and provision is made for carrying at least two patients at a time The side view indicates the method of placing the patient in the upper cot

In many respects the vehicle differs materially from those produced in America. This is particularly true of the interior appointments, to which much attention has been paid in the l'nited States. It will be seen that the door covers only a portion of the rear, and while opportunity is afforded for the surgeon to work upon the patient on the way to the hospital, entrance to the apartment is by no means as easy as with American ambulances. Evidently the Germans have some-

TRACTOR KEEPS BUSY.

An interesting experiment was tried with a Marshail oil tractor in ireland recently, when the owner set it at work operating a four-foot circular saw, cutting oak and ash planks 20 inches wide, a chaff cutter and an oats crusher. at one and the same time. This work went on continuously for four hours, during which time the machine consumed three pints of gasoline, five gallons and two pints of kerosene and about two quarts of lubricating oil.

SUGAR INTERESTS SEEK MOTORS

Several of the owners of sugar plantations on the island of Mauritius in the Indian occan are interested in the availability of motor vehicles for hauling supplies and crops. It is pointed out that the climatic conditions require some special provision of protection from the heat, but in other

respects it is anticipated there will be little difficulty in securing suitable transports for this service.

WANT TRACTORS IN AUSTRALIA.

Duncan & Fraser, Adelaide, South Australia, is arent for tractors, particularly of the agricultural type, and has succeeded in placing a number of these. However, it is understood that the farmers throughout this district are anxious to secure a light tractor of the internal combustion type, and manufacturers of this class of vehicles undoubtcults would find a good market in this section.

AGRICULTURAL TRIALS IN ALGERIA.

The directorate of agriculture in Algeria has arranged a May 26 to June 15. Foreign manufacturers are invited to make entry, and applications should be addressed to the Director de LeGole Cagiculture Malson-Carree, Algeria.

TASMANIA NEEDS TRUCKS.

Regular passenger motor service is being operated by concerns in Tasmania, between Hobart and Launcestown, and it is said that both lines are well putronleed despite the railroad communication provided. The success of these vehicles has led to a study of the problem on the part of the owners of some of the fine fruit growing ranches in that vicinity, and it is anticipated that a splendid market will soon be developed for motor trucks in the bandling of this product.

SEPARATE SHOW FOR OLYMPIA.

As is more or less well known the people of Great Britain have been compelled to visit Manchester each year in order to acquaint themselves with the new things in commercial vehicles. There was an effort last year to plan a notor truck show in London, but the manufacturers frowned upon the plan. Arrangements are now being made for the 1913 show senson, and it is regarded as practically certain that a separase display of industrial transports will be held at Olymnia in London during the coming winter.

AGRICULTURAL MOTORS IN URUGUAY.

Plans are avering completion for an international competition between agricultural motors in Montevilne, Praguny, during the summer. The Association Rural del Urannay has the matter in charge, and permission has been received from the government to adult all competing machines duty free. In addition the railroads have agreed to transport these vehicles gratis. The entrance fee is \$5.0, gold, for each machine. The entry list was scheduled to close May 1, but as the competition is to extend until Oct. 1, it is probable additional time may be allowed.

OPENING IN THE FAR EAST.

Great Britain reports a large number of inquiries concerning the use of heavy motor vehicles in the Far East, and particularly in China. The roads are bad and the running costs are extremely high, as has been demonstrated with vehicles now in service, but there appears to be a growing demand for information upon the subject, and it would seem that the near future is to see a market for a satisfactory line of vehicles. Bally & Co., of Hom Kong, has undertaken the importation of chassis and parts, and expects to construct vehicles which will withstand the strains imposed upon them in this country.

POSSIBILITIES IN CEYLON.

The roads in Ceylon are hard and good and a number of motor vehicles are being utilized with satisfactory results. The following extract from the report of the director of public works should prove of interest:

"The roads from Italian to Fassara, Kumbalwella to Elia, Nanta to Spring Valley and Bandarwela to Liyangu-baw'la have saffered a good deal from the wear and tear caused by the heavy tractors and trailers traversing them. The routin of introducing tractors and trailers with steel and the state of the routing tractors and trailers with steel and the state of the state



Interior Construction of New German Motor Ambaiance,

"The government has recently ordered for experimental purposes a more lorry, with five feet its inches over this inches over the which selected with rubber tires, maximum axie load, fully loaded, not exceeding three tons, and hopes are entertained that vehicles of this type will not only be found as untable for use on many of the existing roads, but also they will meet the reasonable requirements of the users of the roads."

SEEK AGENCY FOR SOUTH AFRICA

A representative of a firm in Johanne-burg, South Arti-Ca, has been visiting England for the purpose of securing as the property of the property of the property of the property of the understood that the management of the prince at Wissiersrand is extremely anatoms to utilize industrial transports in the hauling of supplies and mining products, and those who are producing vehicles of this character would find an excellent market in this section.

Dig Led by Google



MECHANICAL NOTES AND TIPS FOR DRIVERS



WHEEL ALIGNMENT AND TIRES,

in view of the educational campaign being conducted by the manufacturers of tires to correct the evils and abuses to which solid members are subjected, a consideration of the causes of poor efficiency will prove of interest, both to the driver and the owner. The manufacturer has expended coorer the cause of complaint as well as to perfect the compound of the rubber.

During the early days of the commercial vehicle the maker was puzzled to note that while some tires gave saiisfaction, others of the same make in service with the same company, developed what appeared to be serious defects. After much study and numerous tests it transpired that the majority of the complaints and tire failures were due to to the fact that the shoes had been run on machines the wheels of which were out of alignment.

Operators of the pleasure vehicle watch their tires to note if they show signs of wear due to this cause, but its driver of a mechanical transport equipped with solid members is apt to be careless. This does not arise from a low of knowledge but rather neglect in regularly examining the care to assertian if it we wheels are liked up.

it is said that it is a common experience for tire makers to receive a complaint that, with a vehicle on which their shoes have given excellent results, new tires have collapsed at the end of 1000 miles or so, and an examination has, in the majority of cases, proved that owing to some accidental cause, the wheels have been thrown out of alignment. A company manufacturing pneumatica only, issued a pamphiet on this subject recently in which it was pointed out that misalignment of tires reduced their efficiency about 90 per cent, and it is safe to estimate that the value of a solid tire is affected at least 50 per cent. The effect upon the material varies. in most cases the rubber will wear away evenly, but with such rapidity that it is quickly noticed by the driver. In other instances flats are worn on the surface of the tire, creating an impression that the material utilized in its construction is of varied quality.

Effect of Misalignment.

The effect of wheels out of alignment may be realized by taking a couple of coins in the fingers and rolling them by taking a couple of coins in the fingers and rolling them parallel. It will be noticed they revolve quite easily, but if the coins be set at an angle to each other, although in a vertical position, a considerable amount of side pressure will be noticed. This is what takes place when the wheels of a commercial vehicle are offers or inset from the parallel. The experiment will also convey some idea of how damage to title size of the size of

As the wheels are always held the same distance apart on the axie, a continual grading action takes place at the point of contact with the road, this wearing out the tires considerably quicker than would be the case were the wheels perfectly parallel. The extent of the wear may be realized by a simple calculation. If the wheels were offset to the extent of only one inch out of the parallel in a

diameter of 32 inches, they would, if free to separate, be over three miles apart at the end of a test of 100 miles. The wear may be illustrated by holding coins against a tragrindstone, first parallel and then set at an angle. In the first case the coins will revolve freely without suffering any apparent damage, but when inclined the grinding section will wear away the metal all around the rims.

Among the principal causes of wheels becoming our of parallel are: Violent contact with curbstones and carelessly running over large obstructions in the road. Tados lost motion in the bearings of the wheels and seterfield is an undue amount of play steps should be taken to remedy the defect, otherwise damage to the tires is inevitable. Lost motion in the secring gear is the chief cause of flats wearing around the tread of the shoe, this being brought about by the constantly altering direction, unevenues of running, and the twisting effect at the point of contact with the ground. Misalignment is not confined slone to the frow wheels, as the rear members may be affected, although this condition is the exception rather than the ruie.

Testing the Wheels.

The garage, whether it contain one or a feet of submobiles, should be equipped with some devire for celestantly testing the alignment of the wheels and a measuring member may be constructed easily from two pieces of sill wood battens which should be about 1.5 or two lacket square and about nine feet long. In the ends of these members small holes are drilled and two equal lengths of strike. Cord or twin inserted therein. Care should be taken to make the holes in the wood equidistant, and the ends of the twine in heling passed through the holes should be knowled and secured in a suitable manner, so that there will be no variation in the lengths of the cord.

The wooden members should then be placed over the backs of two chairs or suitable rests, so that the lines of string are adjustable in a straight line along either side of the machine. The front wheels should then be jacked up clear of the ground, and the wooden strips adjusted so that the twine on one side is dead straight and equidistant from the edges of the flanges or rims of the front and rear wheels. As there is sometimes a difference in the width of track of the back and front wheels, the sctual distance of the twine from each wheel may not be the same, but this is of no great consequence so long as the same difference exists on the opposite side. It is important, however, that special precaution he taken to see that no difference exists on the distance fore and aft of the diameter of each particular wheel. Having made this adjustment, measurements should be taken of the corresponding posttions of the wheels on the opposite side, and should there be any variation, it is obvious that the wheels are not parallel and require attention,

Correcting the Faults,

The chief irregularity noted in this test will probably be that one of the front wheels is out of alignment as lie dicated at A or B in the accompanying illustration. To correct this fault the thereof abould be lengthened or back ened, according to whether the trouble is in front or back of the axie. The tierod is usually provided with an adjustement sleeve by means of which the missilignment may be

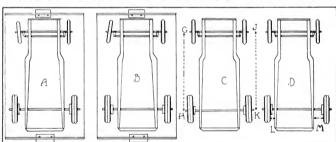
rectified. If not the rod will have to be removed and remeded. The cost of an adjustment member is slight and should be fitted. The wheels should be adjusted so as to be parallel when they are thrust outward in front as far as any slight play in the steering mechanism will permit, as the forward movement of the car along the road tends to keep them in that nostition.

It may be that the rear wheels are not aligned; that is, not parallel, and if so it may be caused by a vifosic collision with some object which has beat the axis. The axis should be removed and repaired, after which the wheels should be tested. Another cause of installation ment in despite the axis of the collision of the colli

A serious instance of displacement is noted at D and this is detected by measuring the distances from the inside of the rim of the wheel and the chassis frame at points L and M. An examination of the wheels for misalignment should be made every day or at the least as often as once a week. as a rule may be taid to water in the pipes. Some types of generators are troublesome in this respect and the only cure is to get a new one or fit the piping aystem with a trap. The latter may be constructed from a droy ellow. One opening should be closed permanently and the other faired with a ping. The pipe leading from the generator is cut at its lowest point and the trap inserted in the line by drilling two holes in the clowe and soldering in twiling. Being at the lowest point of the tubing the moiture will collect and may be drained by removing the plus.

PEERLESS WORKS DAY AND NIGHT.

A demonstration of the earning capacity of the commercial vehicle is noed in Fall River, Mass., where a three-don Peerless truck, made by the Peerless Motor Car Company, Cleveland, O., has been in service day and night for over a year. The machine is employed by the M. Swerney Company, and two shifts of men are employed. In the daytime it is utilized for general trucking and moving household goods. On Sundays, in the summer, passenger seats are fitted and excursionists are carried to the beaches, etc. During the strawberry season it has revularly carried two truck loads every night from Pall River to Providence, R. I.



Depicting the Effect of Minaligned Wheels upon Tires, and a Simple Method of Testing the Members: A, Front Wheel Busty (not of True) B, Similar (undition with Wheel Inset: C and D, Blustenting Lucqual Adjustment of Radius Rods and Displacement of Rear Asie,

and a more complete test, back and front, at least once a month. By observing these precautions the life of the thres will be augmented and the npkeep of the vehicle reduced thereby.

A SIMPLE WRENCH KINK.

In the event of an adjustment belon necessary upon the road and the tool kit is not equipped with the proper sized 8 wreach, and an ordinary monkey wrench cannot be employed, one of the former type but slightly larger may be utilized by placing a strip of thin metal between the nut to be worked and the Jaw of the tool. A few pierces of an old hackaw blade or metal will prove handy as with these an odd sized nut may be removed or tightened with a standard tool having a larger opening.

WATER IN ACETYLENE PIPES.

Where generators are employed to furnish acetylene for the headlights and the flame flickers, the disturbance and the ear is used frequently for transporting freight. It has left Pail liver at 5 in the morning and taken a heavy load to Lynn, Mass., and after covering 120 miles was back in Pail River at 7 in the eventing. It has frequently covered 200 miles in 24 hours. The machine is fitted with a special convertible body. The sides and top are removable and the latter is adjustable to height. After covering 5100 miles that the trees were renewed. So well pleased are the owners that a repeat order has been placed with the Peerless Motor Car Comonay.

MARKET IN SOUTHERN NIGERIA

It is understood that the people of southern Nigeria, British Africa, are anxious to develop the hack country by the utilization of motor wagons. The difficulty of getting goods conveyed to stores located at a distance from the coast is very considerable under the present methods, and it is thought that by cutting a track through the brush it would prove possible to reduce the cost of transportation very materially.

OVERLAND LIGHT DELIVERY WAGON FOR 1912.

NCREASING interest in the light delivery motor vehicle for all classes of service for which such wagons are available, has resulted in the production of numerous models within the past few months. Among the makers devoting

The bore is four inches and the stroke 4.5, giving a horsepower that is rated conservatively at 30 by the maker. The speed range is from 4.5 to 50 miles an hour, and extended tests have demonstrated that the car will operate success-

fully on an average of 20 miles to a gallon of fuel

Ail pistons and rings are sccurately ground to size and fitted with extreme care. The cylinders are supplied with ample water jacketing surface, and particular attention has been paid to the matter of cooling, which is by thermo-syphon. The radiator is of the honeycomb tubular type supnorted on either side by trunnions which take up all road stresses. The special design is with reference to securing the minimum amount of wind resistance. The six-bladed adjustable fan is bung from an arm of the crankcase,

extended upward and is driven by belt from the crankshaft. The maximum temperature of the water is held by the maker to be 198 degrees.

The crankshaft is of a special grade of alloy steel, hardened and ground. The bearings are of liberal area, five in number, plain, die cast, and very accurately fitted. Ertreme care has been taken in the matter of fitting the injet and exhaust manifolds, to permit the easy ingress and egress of all gases. The camshaft is of a selected quality of steel, fitted with three hearings of the same material and design as those of the crankshuft. The camshaft is hardened and ground to limits, thus insuring the size of the bearings and the certainty of valve timing.

Lubrication is by a force feed offer to the cylinders with constant level spinsh in the crankerse. The system has a capacity of one galien. Ignition is by home spark, utilizing a Splitderf dual magneto and dry cells. The earburetor is of the float feed type, and the design has proved very effcient in service. The gasoline capacity is 14 gallons. Igni-



Overland Wodel 50 Express Light Delivery Wagon for 1912,

their attention to this class of work is the Willys-Overland Company, Toledo, O., maker of the weil known Overland line, which brought out a vehicle of this type last year. In making its announcement for 1912, however, it develops that the Overland light delivery is much more interesting than the older design in many ways,

It will be remembered that the 1911 model was fitted to a 25 horsepower chassis, the motor having a bore of 3.75 inches and a stroke of 4.5. The transmission was of the Improved planetary type, two speeds forward and reverse. Other features differed materially from what is offered in the new chassis.

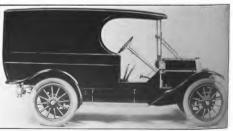
Two views of the 1912 model are shown herewith, that equipped with an enclosed body being known as the 59 Special, while the other is to be termed the 59 Express. Both are designed to meet the varying requirements of a wide line of purchasers. The Special is easily accessible from the rear, two large doors, extending the full height, being fitted. The Express also is of ample dimensions, and each is handsomely finished,

the former in marcon with black trimmings, and the latter in Overland bine and gold. As has been indicated, the chassis is the same for both models, and is rated at \$60 pounds.

The reputation of the Willys-Overland Company in the production of pleasure automobiles is too well known to need comment. it is sufficient to say that the same careful workmanshin and attention to detail is evidenced in the construction of the light delivery wagon. The best of materials is utilized throughout, and particular endeavor has been made to produce a vehicle which shall withstand severe usage.

The motor is a four-cylinder, four-cycle, water-cooled unil

of the 1, head type, with all vaives on the left hand tion and carburetion are controlled by levers located on the side, where they are operated from a single camshuft with integral cams. The cylinders are cast separately of a high grade gray iron and are arranged vertically under a hood.



Overland Model 56 Special, a Satisfactory 1 tillity Vehicle,

steering post.

The clutch is a cone member with a woven asbestos and wire facing which is heat proof and will not char. This engages with the cast iron inner surface of the flywheel. The transmission this year is sejective, permitting three forward speeds and reverse. The following gear ratios are provided: One to one for the high, 1.55 to one for the in-



Left Side of Overland 30 Horsepower Motor,

termediate, 2.57 to one for the low, and 3.3 to one for the reverse. This is located as a unit with the rear axie system, and F. & S. annular bearings are employed throughout. Drive is by shaft, through the torsion tube to the bevel gear on the live rear axle, which is of the semi-floating type and equipped throughout with Hyatt roller bearings.

The frame is of channel section cold rolled steel. The front springs are semi-elliptic, 36 inches length and 1.75 inches width, while the rear members are three-quarters ellintic and of the same dimensions. The front axle is an I beam section, drop forged, the wheels running on ball bearings. Service brakes are expanding on the rear hub drums, controlled by nedal; the emergency members, contracting on the rear wheels and controlled by lever. The brake drum dismeter is 18 Inches with a width of 2,5625 inches.

The wheelbase this year is 106 inches, as compared with the 102 inches of 1911. The tread is 56 inches. Wheels are of the artillery wood type, with 12 1.5-inch spokes and

12 bolts to each wheel. Tires are pneumatic, 33 by four inches, all around

Special mention should be made of the control system. will be noted from the accompanying illustrations that the central position of levers is favored, this being of particular interest to the operator of a delivery wagon, where it is destrable to have easy access to the driver's seat from elther side of the vehicle. The steering post is off the right. This is fitted with a worm and gear type of steering mechanism and a 16-inch laminated wood hand wheel. The gears operate on plain bronze and ball thrust hearings. and the steering knuckles are of

Tobin bronze, eliminating all danger from leakage. Every effort has been made to provide for a satisfactory

delivery wagon from every viewpoint. To this end the dimensions of both bodies are very liberal. The length of the motor truck department of the company,

the floor in the Special model is 60 Inches, and the width 43. The height from the floor to the top is 53 inches. This is sufficient to permit of carrying a full load of light weight products, and makes the car particularly desirable by florists, grocers, jeweiers, etc.

In the Express, the length of the floor is 67 Inches and the width 42. The height of the sides is 10 inches, and the width of the side wings six inches. The utility of this equipment will be apparent to those who are seeking a wagon designed to provide ample carrying capacity for all classes of merchandise.

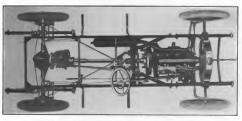
With each of these bodies, the company furnishes two gas headlights, two oil side lamps and one oil tail lamp, generator, full set of tools and tire repair kit. There is little doubt that both of them will neet with ready acceptance by a large number of concerns who have been awaiting the arrival of a light delivery wagon with plenty of reserve power and designed to meet every need.

INTRODUCING MOTOR PLOW.

California farmers are being converted to the use of motor propelled agricultural implements, the Hackney Manufacturing Company, St. Paul, Minn., maker of Hackney plows, having established a Pacific Coast branch at Los Angeles. The plow is the invention of Levile S. Hackney. president of the company, and is 14 feet in length and six feet five inches wide. It is equipped with a four-cylinder, four-cycle motor, having a five-inch bore and six-inch stroke, and its maximum is obtained at 800 revolutions a minute. The machine can be utilized for many nurposes. By means of a side lever the blades may be raised clear of the ground and the device employed as a tractor. It also can be used to saw wood and perform numerous other duties about the farm. The plow is being demonstrated to the farmers.

GOODYEAR TIRE PRODUCTION

In celebrating its birthday recently, the Goodyear Tire & Rubber Company, Akron, O., maker of Goodyear tires, enlarged its production facilities so as to increase the daily output of 4000 tires to 5000. This has particular reference to the shoes for pleasure vehicles, but it is interesting to note that the concern is now manufacturing between 400 and 500 solid motor truck shoes a day. This means that during the year 1912, 7,500,000 pounds of material will be



Overland Light Delivery Chassis is Remarkably Simple in Besign,

needed to meet the requirements of this concern in this particular field. The daily output is sufficient to equip 150 vehicles C. W. Martin was recently appointed manager of



The value of the light capacity electric delivery wagon is conceded by a large number of department stores, who have installed this type of vehicle. The usual method has been that of thoroughly testing out one or two cars, and when these have had opportunity to demonstrate their practicability increasing the equipment along lines which experience has dictated is best.

In an accompanying illustration is presented 15 of the 22 1000-0,000 betroft clertch wagon, made by the Anderson Electric Car Company, Detroit, in service with Carson Piric Scott & Co., Chicago. This fixet has been in operation for more than a year and has given entire satisfaction in covering various routes. These 15 are garaged in South Chicago and operate in that territory, while others are stationed in Evanston and Highland Park. A few of the machines owned by the company are of one ton capacity. The entire fleet handles merchandise brought to the respective territories by larger cars.

The light vehicles are equipped with Edison 6n-cell barteries; in fact, it may be stated that this type of battery is used exclusively in the Detroit electric cars. The motor is the firm's own make, a series wound type, in which varied load and road conditions are bandled without undur increased current consumption. Copper and from are used lar, both being special drop forgings. All wheels are of the artillery type, made from second growth hickory.

The wheelbase is 80 inches, the tread 56 and the road chevarance 12. The length of the body is 129 inches, which 66 and helght, 50, the platform being located 30 inches from the ground. Tires are solid, 32 by 2.5 inches in ches and 34 by two inches in rear. The rated speed is 14 miles an hour and the mileage, loaded, about 15.

The tlaker Motor Vehicle Company, Cleveland, O., is producing a Baker elevtric ambulance, for which is claimed unusual advantages. It is pointed out that an electric vehicle of this type is not only capable of fravelling at the required speed, but is sanitary, ande and silent. In addition, it is readily adaptable to all manner of electric equipment, such as extension lamps, warming pads, water heaters, etc. Such appliances may be installed easily, and it is obvious that they are of immense practicability and utility. The current which they consume is inconsiderable and may be supplied from the battery which runs the car.

When equipped with pneumatic tires, the Baker subslance has a speed rating of 18 miles an hour. The body rests on a 1000-pound chassis. The interior arrangement is such that two patients may be carried at a time, with



A Portion of the Fleet of Detroit Electric Light Delivery Wagons (iwned and Operated by Carson Piric Scott & Co., Chicago,

In such quantities as to withstand overloads for long periods without excessive heating. The brushes are well mounted and of liberal area. The normal voltage is 70 and the ampere rate 30 at 1300 revolutions a minute.

The controller is of the continuous torque, drum yue, also made by the Anderson company. Heaty of connet area is afforded, the contact fingers being held under tension by isaminated springs. The reverse switch is of the improved laminated type, mounted with the controller. An interlocking device of simple construction climinates the possibility of the driver "bucking" the motor, it being necessary to bring the controller to a neutral position before changing the current direction. Ollers are provided at all important holds.

The expanding hand type of brake is employed, both on the wheels and countershaft. Springs are semi-elliptic front and rear, resting on large dimension asks scats, through which are drilled holes for the clips. The frame is of channel, angle and T steel. All joints are hot riveted. Sheet steel is used for the battery and motor compartments, this being riveted to the frame members and batter; supports. The front axios are to beam, and the rear rectampports. The front axios are to beam, and the rear rectampplenty of room for two attendants. One patient is placed on a rigid frame cot which rests in a runway on the foor, while the other may be carried in a stretcher asspended from a unique spring hanger. The interior finish is in white enamel, and all cracks and crevices in the floor and sides have been eliminated to facilitate proper sanitation.

The Continental Car & Equipment Conquary of Highland Park, a suburb of Louisville, Ky., has an electric moor truck proposition under reasideration. As a matter of fact it has two ears in operation. The first model was a threton whicle which left the shops a short time ago. This is being tested out with a view to interesting capital, and it is intimated that it may be decided to manufacture the product in one of the cities in the East. Much interest has been aroused in the plans of the company, because of the fact that it is well known as a producer of contrator's dumping cars, now in use in all parts of the world.

The M & P Electric Vehicle Company, Detroit, Mich., is a new concern which brought out a 1900-pound car during the recent Chicago show. The concern has capital of \$50, 600 and the officers are. President and general manager, Charles L. Pepper; treasurer and sales manager, M. C. Merriman; secretary, Burton Grandy. The product is presented in accompanying illustrations, one of which shows



The New W & P 10001-Pound Vehicle Produced in Detroit,

the chassis equipped with an open express body and the other with enclosed delivery.

The motor, an 80-volt Westlenkouse unit, is located well forward, the drive being through a propeller shaft to a countershaft through the small bevel gears enclosed in a housing which also contains the differential, and thence by side chains to the rear wheels. In order to make use of the propeller shaft the battery, a 40-vell Gould, is divided, each section of 20 cells being enclosed in its own box and bans on either side of the car. The location is such with reference to the undefaurd and other parts of the machine, that nobling interferes with easy access to the boxes for removal and replacement of cells.

The controller is almost directly over the motor, which is under the sent, and as the battery bayes also are close to the motor, all wiring is short. In addition this makes for easy location of the fault, in case trouble should occur. The motor is resulty accessible through the floorboards and the controller through the front bards of the sect.

The main chassis frame is of three-inch channel steel with suits and cross pieces af the same stock. The springs are semi-elliptic front and rear, Both axies are of Weston-Mott manufacture, the front incurince being beam and the rear, square forced shaft. The Jackshaft also is a Weston-not to the S. A. E. standard and fitted with three-inch solid tree. Procurates may be had as an option, however,

The wheelbase is 100 inches and the tread 56. The loading space with the express holy is 80 by 42 inches and with the enclosed body, 86 by 42 by 56. The rated speed is 12 miles an hour and the mileage 50.

The combination of the old Electric Vehicle Company of Company of that city, under the terms of which the former concern becomes the electric truck department of the later concern becomes the electric truck department of the later later properties to result in a rapid development of the 'Phan Ibun-pound car made by I. Henry B. Hewitz, president of the Electric Vehicle Company, becomes general manager of the Electric Vehicle Company and t

The present capacity of the plant is 150 cars a year, but the company stands ready to increase the equipment and enlarge the capacity as the demand is developed. This only one of the advantages of the combination, however, inasmuch as the Kentucky Wagon Manufacturing Company, before its absorption of the electric truck concern, had

begun to specialize in the production of motor truck bodies of all types. This will give the purchaser unusual facilities for securing that which will best meet his needs.

Among the features which have been added to the Urhan wagon are several devices which are calculated to ent-ed its field of insefulness. These include a blower, a pump, incandescent lamps and other equipment operated by current from the batteries of the car. For emergency work, such as is undertaken by the Kentucky Electric Company of Louisville, which owns one of these vehicles, involving the entrance to manholes, which frequently are filled with hostious gases, the car promises to be fixationable, as it can be utilized to blow out the foul gases, light up the working spaces, which were the contraction of the con

C. L. Morgan, asies manager of the electric division of the General Motors Truck Company, Detroit, maker of G. M. C. cars, recently superintended an electric whileder east which will compare favorably with any devised by make, ers of gasoline machine. During one of the heavy shows storms of early April, one of his men drove a three-slond on G. M. C. truck from Pontae to Detroit, carrying a full load and running within 20 per cent. of its full rared capacity. The roads were in decidedly moor condition, and the snow was drifting haddly, pling up in some players as high as tirree feet. Despite these difficulties, the truck made good time and covered 26 miles.

Those concerned with the delivery of l'nited States mail are becoming more and more convinced of the special advantages presented by electric waxons. Those which have been placed in service in many cities throughout the country, have demonstrated their efficiency ander every test, and it appears to be a foregone conclusion that the Post-office Department will decide upon the extreasin of their use as opportunity affords. It is not so much a question of load or miterage capacity which interests covernment officials in this field, but the most essential feature is the ability of the electric to start and stop readily. In the collection of mail it is necessary to make frequent short stops, and there is a real demand for a cur which will be certain to start at once without cranking and other tedious pre-limitaries.

I'pon recommendation of Julien A. Haiford, a well known English engineer, H. G. and F. G. Sharp of Toronto, Can, practically have decided to innugurate a motor 'bus



M.A.P. Electric Phassis Equipped with Envised Delivery Rody, service in that city. It is understood that the type of vehicle determined upon is a double-deck electric car with seaiing capacity for 50 persons. The plans call for the purchase of no less than 50 machines.

The General Vehicle Company, Long Island City, N. Y., maker of G. V. electric trucks, has been studying some of the reasons for the large installation of its vehicles, included among which may be mentioned the 21 operated by Tiffany & Co., New York City, which bave been in use 10 years; the 50 owned by the Anheuser Busch Brewing Company; the 48 belonging to the Peter Doeiger Brewing Company, which has the finest reinforced concrete electric garage in the world; the 72 operated by the Jacob Rupert Brewing Company; the 38 owned by the R. H. Macy Company, and those numbering 100 or more in service for the Adams Express Company and the American Express Company. It finds the answer in the single word, "simplicity." The investigation is summed up as follows:

"One of the potent reasons for the success attending the introduction of the electric truck is its extreme mechanical simplicity. A simple series wound motor, practically of the same character as those used in the street cars of every city and town, is used to drive the vehicle. A Morse silent chain conveys the power to the countershaft, and roller chains to either side earry the power to the rear wheels. So simple is this power plant that it is seidom, almost never, out of order.

"A small lever is pushed forward by the driver's left hand, and the car moves forward; the further forward it is pressed, the faster the truck goes. To reverse the vehicle, the lever is pressed back, and the car run backwards. The steering wheel and post are ragged and simple. A pinion and sector give motion to a bell crank which through rods operates the steering knuckies on which are the front wheels. The whole operation is so simple that a teamster who understands the rules of the road, makes an efficient

driver after a few hours' experience.

"Another, and perhaps one of the greatest reasons for the success of the electric vehicle, ranking second only to the improvements in construction, is the intelligent way in which it is sold. In the past they were sold to anyone who wanted to buy, and for any class of work. The result was many impractical applications. Today the seiling engineer looks over each proposition, and if one is presented that is not practical for the electric to handle, the customer is advised to use horses or some other form of motor vehicle.

"This leads to the suggestion that the transportation superintendent should cease to think of the electric as a competitor of the gasoline driven machine. The true efficiency of the latter commences where that of the electric ceases. The electric should not be sold for the gasoline work, the long, straightaway hanls with few stops, nor should the gasoline he placed in the electric truck field, the short and medium runs with many stops. Whenever either form is operated in its wrong sphere, fallure is sure to result."

The Baker Electric Company of Michigan was incorporated at Detroit, April 3, with the following officers: President, J. Caldwell Walker, Detroit; vice president, R. C. Norton, Cleveland, O.; secretary and treasurer, William C. Burnett, Detroit. This is to be a direct factory branch of the Baker Motor Vehicle Company, Cleveland, O., maker of Baker electric cars. The new salesroom will be located in the heart of the antomobile district on Woodward avenue, and a complete line of pleasure and commercial vehicles will be carried.

William H. McLelian, a salesman at the Boston branch of the R-C-II Corporation, Detroit, recently took a 1000pound Hupp-Yeats delivery wagon over the road from Providence, R. I., to Boston, carrying a load of 750 pounds, in 4:15:00. The distance covered was 52 mlies according to the speedometer. in many respects this was a remarkable demonstration

While it is generally conceded that the legitimate field of the electric is in city and suburban work, it will prove of interest to note that this trip was over country roads, some of which were of macadam it is true, well supplied with bills and in a condition at this season of the year which would tax the ability of any machine. The running time is worthy of comment as well. The Hupp-Yeats undoubtedly will meet with decided favor in New England, if it is abie to make such trips with reserve energy, as is said to have been true in this instance.

"That the gasoline chassis is popular today," says C. L. Morgan, sales manager of the electric vehicle division of the General Motors Truck Company, "Isn't to the discredit of the electric. They both have their distinct fields, but do not think for a minute that the electric truck makers have not been progressive, for they have worked just as hard to secure the serviceable vehicle as the other branch of the industry.

"Their popularity will increase with a better knowledge of their advantages. Take for instance the G. M. C. electric. embodying as it does, two features that are as important mechanically as any improvement made on a gasoline chassis. We have eliminated the chain which is commonly used for the first reduction from the motor to the countershaft.

'Another vital point in the electric chassis construction is the position of the batteries. We have placed them where they are accessible, above the frame and under the driver's seat. This location eliminates time, labor and the trouble of disconnecting and drawing out the batteries for inspection, and the difficulty of caring for them through trap doors in the floor."

The General Vehicle Company, Long Island City, N. Y., announces that its plant is now working to full capacity and the construction of a new factory is under advisement. Over 100 G. V. electric trucks were shipped during April, and there are many orders on hand for delivery as lats as next November. Prospects are also bright for many new orders from all sections of the country, and some of these are expected to reach as high as 30 from new customers.

The bulk of the General Vehicle business, however, comes in the form of repeat orders. The company is now reaping the reward for standardization and conservative selling methods put in force five years ago. That it psys to have high standards in building and selling motor trucks is evidenced by the growth of this pioneer manufacture. It is held by this concern that it is better to sell two trucks to a customer and bave them adapted to his work than to make sales indiscriminately and secure few if any repeat orders.

TRUCK REPLACES SPUR TRACKS.

The Groton & Stonington Street Railway Company, Groton, Conn., is planning the purchase of a truck for the purpose of making deliveries from its express cars, this being necessary owing to a rapidly increasing business. The company handles considerable freight for manufacturing concerns and the latter have requested the building of spar tracks to their plants. ity installing a machine for this work it is figured that considerable expense may be saved and the service improved. It is proposed to run the automobile to Mystic In place of the usual cars. A trial was given of an automobile and the demonstration was successful in every particular. The installation of such a service will be a great benefit to the business men and other patrons

RECENT MOTOR VEHICLE PATENTS

De Fazi Piston.

Fulvio De Parl, Providence, R. L., assignor of one-half to William D. Hiossfeld, has been granted a patent for a gas engine piston, which presents unique features inasmuch as it dispinesse with the usual wristpin. The head of the piston carries a thrust block which engages with the ball end of the connecting rod. The block is adjustable, being servesed line a larger, similar member and is provided with a set serve, the purpose of which is to take up lost motion. The ball and socket members are inbritated by means of an oil duct which leads from the side of the piston to the top of the ball aportion of the connecting rod. It is claimed by the Investor that perfect alignment is secured and that wear upon the walls of the cylinders and piston rings is reduced to a nalimum by the ball and socket device.

Buffum Oll Can Holder,

Frank Washburn Buffum, Louisiana, Mo., has been granted a patent for an oll can holder which comprise a metal base having integral jaws and carrying a boss and lugs on the underside. A pivotally mounted jaw is fitted which exerts a downward pressure, forcing the member into enasgement with the lower edges of the font of the oil can. The latter is enaged or released easily, the inventor claims.

Larkins Muffer.

Herman, H. Larkins of Princeton, Ky., has patented a muffer which differs from those of usual construction, linamuch as the device is made in two sections. It consists of two cylindrical members with ends closed, with the exceptions of the linet and exhaust portions and connecting tube. The drums are exparate but connection between them is naintained by a tube which extends about two-thirds of the way into the interior of each cylinder. Above this pipe ing are placed the inlet and exhaust tubes. The gases enter through the latter and exhauding, pass through the larger tube into the second drum where the operation is repeated before the burnt products escape into the open air.

Anthony Mowing Machine,

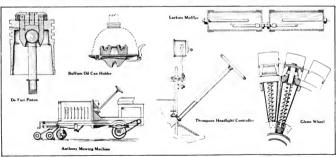
Wendell P. Anthony, Eddystone, Penn, assignor to Willam Simpson & Sons, Philadelphia, has paterated a mowing machine propelled by an internal combustion motor. It is similar to a motor car with the exception that the forestartrisk carries the grass cutting mechanism which comprises three independent rotary cutters operated through universal joints. The arrangement of the cutters is such that the middle member cuts a swab between those of the others.

Thompson Headlight Controller,

Various devices have been invented for swiveling lamps, of the bonnet type, but a new departure is noted in the invention of Francis E. Thompson, Arlington, Mass., who has been granted a patent for a device controlling the dash she than the state of th

Glenn Wheel.

A vehicle wheel which the Inventor claims has resillency aithough of the solid tire type, has been patented by Edward A. Gleen, Chicago. This consists of a series of blocklike tread members mounted on a rod and cell spring arranamement. Planges are provided on the under sides of the tread portions and these are of different diameters and adapted to telescope within each other.



Some of the Latest Inventions Applicable to the Motor Truck Industry, Including Asset Ens Engine Piston, Hendlight Controller, Muslier, Mowling Machine, Etc.

CORRESPONDENCE ON PERTINENT SUBJECTS.

Mr. Swinehart of the Republic Rubber Company Discusses the Question of Guarantee for Truck Tire Equipment from an Entirely New Viewpoint.

A NY discussion relative to the use of lires is of deep con-cern to all branches of the commercial vehicle tudustry, and particularly to the owner. The following letter takes up the matter from a somewhat different viewpoint, and the arguments of the writer should prove of interest.

Patter MOTOR TRUCK.

Fourtend that the guarantees made on motor touck tires at I contend that the statistics made on moon took tires at thesent are startinan and mignet. Years ago the inser was entitled to a service guarantee for the reason that efficient distelling devices had not been developed. The majority of motor trucks were under-tired, and the spring suspension has pore, with the result that the service in pass desire for the poor, with the result that the user had up not dearly for the service, but of late the consistent has been improved to a degree that warrants users securing a more improved to a degree that warrants users securing a more constant of the control o

the reason that he is under the direct con-

trol of the user.
The set of elements governing the length of tire service are Material. Workmanship, employed, low speed, road condition and the delter or his useskilling to each par-ty interested such of elements us be mar be responsible for, Intend to show that the user is really more can be obtained from truck lives than either the tire manufacturer or the truck unaunfac-

With regard to matectal exhaustive tests of functorial of different characters have been hat today tire munu-



public Rubber Company, that today the mutua-compounds which in many cases are setting as a features are swing used elect to 18 years are. Even the must be tree than those ling of various stocks under the most server conditions. The warkmannity on truck five has been greatly improved. The designs of the tire have been consistent and testing the stocks under the most server conditions, and the stocks are the server of the stocks are the server of the server of the stocks are the server of the server of

earrying heavier loads. The systems of fastening accures and rim design for proper application of tree have been improved, so that it no longer requires hours to make the changes, and the tire is held more securely in the rim. All this has been the work of careful experts, who have been devoling years of work toward reducing the cost is nife.

the work of careful experts, who have been devolute, years of work toward robusing its rarely responsible for the cuttiment, as recards size of trees. In the part 1 have found many cases where the truck manufacturer turns in 1 have found many cases where the truck manufacturer turns the product of the same part of the part o

track manufacturer hauled seven tons of freight a day for two weeks, upon a three-ion truck, in urder to demonstrate to the prospective purchaser that his truck would do the work satisfactorily. You can readily realize the strain which was thrown upon the tires, Often truck manufacturers will publish photographs of a new model of truck carrying 100 per

cont, excrease, yet in selecting their tire equipment they protide for only a normal load.

The shood at which trucks are operated as controlled to a

side for only a normal limit.

The control of the control of the truck but the truck manufacture that little control of the truck in the truck manufacture that little control of the forume after the truck leaves to be a control of the control of

Steed is not of the fined destructive elements entering into the service due to the exceeds that generated in the tire the service due to the consistency of the service due to the serv Speed is not of the final destructive elements entering unto

tire, track near is really responsible for the road condi-tions for the reason table abouth interior the attack tions for the reason table abouth interior the attack to the property of the property of the property of the bounds for distance may be greater. Economical tire service can be obtained even over bud roads, if the driver will now policient in this speed at which the ejectives. There is a tenjoickness the file speed at which he operates. There is a tendency among drivers to take the shortest route, irrespective of the road conditions, feeling that the tires are guaranteed for a long service. The result is they will drive over streets stream with broken bottles, old brin, stones, etc., which are restant to cut the tires, ereminally resulting in the tires breaks. vertain to call the lifes, eventually resulting in the three breaks, my attention uses that of a large norking company operating served frucks. It germitted its dirters to take a short cut nor four rathroad tracks which seem no lanked for concession of the control of the cont

notes, and they could not pick their roads as ther must make a certain unibure of trips a day of that he be really responsi-ble for 6a per cert of the tire trouble experienced by truck uses. He is directly responsible to the user, and about a work for his interests to the extent that he should spare the truck and tire as musch as possible. A careful driver on get truck and tires as much as possible. A careful arriver can get from three to as x muths more service from as of tires than carry the same book. Spinning the driving wheels when start-ing ar silding thom when stopping, does more damage to the tires than 18 to 25 miles of normal service. Driving in car carry the same book. Spinning the driving wheels when start-ing ar silding the same start in the carry and the load, result-tives than 18 to 25 miles of normal service. Driving in car care of dual tires, one side has to carry all the load, result-ing in an excessive or-cloud for that tire. A careless driver can ruln the best set of tires made in 2000 miles, by neglecting and ruln the best set of tires made in 2000 miles, by neglecting

can min the hest set of tires made in 2000 miles, by neglecting the minal instruction for operating, result interpreted in a machine property of the minal instruction for operating and the minal machine that the tires cannot be destroyed in less than 800 in 10,000 miles, as he case may be it is true that the minus of 10,000 miles, as he case may be it is true that the minus and diving in car tracks, but they have no means of learning in what setten the tire has been aboved. A wormout the find in the setten that the has been aboved. A wormout the find of treatment it has received, with the result that adjusting the minus are demanded and received by the uses while the tire minus are found of the minus and the tracks of the minus and the tracks of the minus of hosts carried, distance trackled, and right that he true of hosts carried, distance trackled, and right that the true. of loads carried, distance travelled, and trips that the truck makes. This would prave to he a very expensive plan, even if a re not kept, and the user simply sucesses that he has not had sufficient service. Hercottly a user claimed that he was not operating his truck more than 20 miles a day. I took more than 20 miles a day. I took morning and finished all short 21 in the atternoon, in order to check the allstance. That route alone measured 22.5 miles, and he usually mode short trips during he atternoon, so that his mileage a day was nearer 40 than 20.

The tire manufacturer is responsible for workmanship and

The tire manufacturer is responsible to with manufacturer in developing and improving both the construction and the material used, and

I am satisfied that all reputable manufacturers are honestly to give duliar for dollar in the service. The guarante from the maker's standpoint, is simply a wager that the tires will run a stated number of miles. If the driver prefers to have them do less, he promptly sets to work to destroy them in the shortest possible time.

the shortest possible time.

The truck manufacturer maintains that a long guarantee on tires aids him in selling his trucks, as he can figure upon a stated tire cost a mile. This, perhaps, is true, to a certain degree, but as the truck manufacturer assumes no responsibility in connection with tire equipment, i feel he should leave this matter largely in the parties most directly interested—the tire manufacturer and the user. The truck manufacturer is only indirectly responsible for the service that tires will give, for the reason that the matter of loads, speeds and road conditions, are entirely in the hands of the user, through the agency of his driver.

The truck user is responsible for more of the elements conducive to an economical tire service than the tire manufacther and the truck insultacturer together. He has direct con-trol over blooks, speed, roads twarrend, and the driver. Upon these four elements delered more than 15 per cent, of the re-sponsibility for the tires not giving the except con-sultance of the truck of the truck of the truck of used in driving. On the other hand, tires of the hest workman-ship and material were ruthed in a comparatively short time, due entirely to the inclinence displayed. Here slope such an important part in determining the length of service, it would seem only just and fair that the user should assume his share of the responsibility, and not trained to be about centre of the turer and the truck manufacturer together. He has direct conturer assume the responsibilities which should really fall to Yours very truly, the user

B. C. SWINEHART,

Sales Manager Motor Truck Department, Republic Rubber Company

Youngstown O April 2.

SHOULD MAKERS GUARANTEE THEIR PRODUCT?

WHILE prospective purchasers of industrial transports naturally are interested in the subject of guarantee, it is possible that they fail to consider the manufacturer's side of the proposition. The accompanying communication gives the opinion of at least one maker on this point:

Editor, MOTOR TRUCK,

Sir, by the buyer of a motor truck has every advantage in the way of saturative. The present externely hub costs of motor truck manufacture are brought about largely by the uncasonable demands made by owners and operators. Thus, of reasonable demands made by owners and operators. Thus, of the control of t realise the advantages to be derived from dealing with the track manufacturer who is producing a first class truck and interest of the producing a first class truck and law of the class truck and investment and will, therefore, stay in business. They can see how a short-time cuarantee by this make is better than a guarantee of two, five or seven years by less conservative, facturer of more trucks will refuse in replace a defective of more trucks will refuse in replace a defective part, if that part he sent to him for inspection, irrespective of any guaranties he may have placed on it.

The commercial vehicle convention in March after careful similaritation of the situation, recommended a 90-day guarantee. This does mean that no maker will replace any defective ter. This does mean that no maker will replace any defective part which may show up ask months after delivery, but was proposed to the proposed of the proposed of the proposed serious upon the proposed of the proposed of the proposed should insist upon the user paying at least for his education instead of continually standing the brun at it and paying for it himself

Experience has shown that one of the great troubles has been to convince the huyer of the type of truck he should purchase if a study of his business showed conclusively to the manufacturer that the buyer should install two-ton trucks and chase start

The manufacturer lays down certain rules of proper care. and specifies carrying capacities and maximum speed limits which if exceeded will result in withdrawal of the guarantee No attention is paid to these, but if the manufacturer does not help the user out of trouble he has gotten himself into the threatens to trada his trucks for some other make. To the serious detriment of the truck industry at the present time, too many manufacturers are abetting this sort of thing.

Some of the highest costs of truck manufactura are brought about because the truck maker has not only to provide the finished truck, but must bear all the burden of expense in Bushed truck, but must bear all the burden of expense in teaching the operators, often even providing the drivers. He must eliber burden to the control of t teaching the operators, often even providing the drivers. Its numt either become an expert on transportation, or hire one and furnish his services free of cost to the customer, who wants an insurance against any possible loss and asks for a sorts of kuaranters which are absurd on their face and which

sorts of guarantees which are about on their face and which does not get in any other members, the loss to be the great gainer, be willing to pay at least for his education? There is nothing that can be done by horses in merchandise delivery that cannot be due to the property of the control should certainly be protected if the purchaser insists on handling the truck his own way long-time guarantees is. I am convinced, showing a weakt in his product, because his policy proves that he is selling his machines on promises and not on their quality

Speed governors should be installed on all trucks. It is lm-Speed governor a should be installed on all trucks. It is im-portant that they should be accurate and really govern, holding the number of revolutions of the motor down to a certain constitution thought and the control of the con-constitution thought are should be considered by the by experts without the knowledge of the manufacturer. To overcome this, every truck should be equipped with a speed-ometer that has a maximum hand or a recorder, which should be ested or lacked and the less kept by the with the truck. show the highest speed attained at any time with the truck. If a fine were charged against the driver for exceeding a cer-tain speed limit, and dismissal were to follow the second fine, of the present truck troubles would disappear. The song that was written several years ago entitled, "It is not the miles we travel but the pace that kills," should be applied to motor trucks and sung all over the land.

Last of all, tire manufacturers should take an absolute

stand against overloading and report every case that comes to their attention to the owner of the truck and to the manuto their attention to the owner of the truck and to the manu-facturer. Above all, they should insist on the use of tres of sufficient size for the load capacity, which they can back up with their guarantees, but they should be perfectly limpartial to all truck manufacturers and not give one an advantage over others, which, at the present time, they are duting in

ny cases Every assistance should be given the National Association Automobile Manufacturers that is devoting so much tima motor truck industry in an effort to establish a perfectly equitable basis on which to do business

Yours very truly

B A GRAMM. Vice President Gramm Muter Truck Comment Lima, O. April 4,

MILLER'S NEW CATALOGUE.

The 22nd annual catalogue of Chas. E. Miller, 97-103 Reade street, New York City, is ready for distribution to such as make application for it. It is a neat and attractive volume, comprising 256 pages of information concerning all of the latest and most approved equipment and supplies for motor cars, motor boats, motorcycles and motor planes, Owners and users of commercial vehicles will find this a decidedly valuable book, particularly as a work of reference when in need of parts or fittings,

As is more or less well known, Chas. E. Miller is the pioneer supplies dealer in the automobile industry. "Try Miller" has become an accepted trade term, as applying when it is impossible to secure the needed accessory elsewhere. As importer, exporter, manufacturer and dealer, this house has gained a world wide reputation, and has 15 brauches located in nine states throughout the country.

Inasmuch as the firm was established in 1896, it is not at all strange that the 22nd annual catalogue should prove a veritable index of the accessory and supply business. The owner of a motor truck will be surprised to find listed therein practically every product of note produced in America or abroad. It also will be found that several new things have been added, and the fact that Chas. E. Miller indorses them is sufficient guarantee of their worth,



BRIEF NEWS MANUFACTURE

THE TRADE

The Kadix Motor Truck Company of 6 Watson avenue, East Orange, N. J., has been incorporated for \$190,000,

Green & Swett, Boston, will open a branch house at Macasater, Mass., having taken a lease of the Wotson building

The Auto Trartor Company, Augusta, Me., has been more porated for \$100,000. L. J. Folenian is president and reasured and R. S. Buzzell, eleck,

The Goodyear Tire & Rabber Company, Akron, O., amounces that its branch at Birminchum, Ala, is occupying its new quarters at 420-422 20th street.

The Federal Motor Teock Campany, Pittsburg, Penn, has been the agency for the Mais truck, made by the Mais Motor Truck Company, Indianapolis, Ind.

James H. Papla, 656 Bergen street, Brooklyn, N. Y. Instaken the agency for the Packers truck, made by the Packers Motor Truck Campany, Wheelbar, W. Va.

The Velle Mater Vehicle Company, Molluc, III., has appendit-ell. Fred E. Bradfield, formerly connected with the Circago branch, as manager of the branch at Boston,

The Pope Munnfacturing Company, Hartford, Conn. is con-

The Astemobile Repair & Sales Campany, 913 North Broad street Pulmbelplin, has taken the agency of the Sandusky line, made by the Sandusky Auto Parts & Motor Truck Company, Totedu. O

The Islon Machine & Lear Campany, Roston, has filed notice of incorporation with a capital of \$25,000. The director meands William L. Thompson, James α Horse and George C.

The C. A. Scott Company has been organized at Portland, Mr. with \$10,000 control and will deal in trucks and motors of all 15per. The others include: President, Hugh Lawson, and

hrm & Davis, Boston, Moss, has been incorporated for \$1,250,000. The incorporators named include William Gray, Alexander Churchward, baxid B. Kerr, William B. Moses, D. Benry Eikhus and William H. Gray,

The Beasemer Mater Track Company, Grove City, Pean loss established a Boston branch at 903 Baylston street, which will be in charge of Robert 14 Howard, who for many years was blendfied with the Autocar Company.

Rubert Kayser, formetly connected with the Boston branch of the Velle Motor Vellele Unuquity, Molline, III., bus accepted a position at the Chicago branch of the company. George D.



Ford Dealers of Grand Rapids, Mich., Who Recently Visited the Ford Motor Company at Detroit, Where the Plant Was Inspected and the Party Was Entertained by the Executives of the Company,

templating the erection of a four-story addition to its plant. furnishing 60,000 additional feet of floor space

The Steinhock Engineering Company, Edgewater, N. J., has been incorporated for \$1,000,000. The Incorporators named are E. J. Forhan, F. B. Knowlton and J. Melaren.

The Worcester Automobile Parts Company, Wurcester, Mass., has been organized and incorporated for \$16,600, James N. Heald is president and treasurer; Cyrus A, Cowan is clerk.

Aftert Bale, Hinckley, III., has been appointed agent of the Velle line and will have territory including beKalli, Lee, tigle and Kane counties. He will maintain a service station.

The Punctureless Tire Company of Massachusetts, Roston, has been Incurporated for \$15,000. The incorporators include William E. Riddell, J. Hiram Smith and Frank H. Jenkins

The Dennis Meter Company, Toledo, O., has been incorporated for \$25,000, the incorporators including 11, 11 bennis, G. W. Close, Allen E. Reid, R. S. Woodrow and J. C. Melrier,

The Vipha Rim Company, Brooklyn, N. Y., has been incorporated for \$190,000 to manufacture motor car rams. The incorporators include C. M. Cisomiell, N. H. Tice and M. P. Bau.

Anderson, formerly with the Haynes Company, is now with same branch

Johason Martin, manager of the South American division of the General Motors Export Company, he on his way in linenos Ayres, where he will establish headquariers for the G. M. C. line of gassiline and electric vehicles.

Perkins & Ferliss, agent at Glaucester, Mass., for the White line, made by the White Company, Cleveland, O., has placed a White truck with the Presson Express Company of that city. The body and top will be of special design.

The Mandard Auto Heating Company, New York City, has filed notice of ineurporation. Its capital is \$10,000 and the incurporaturs include liavid '* Goodman, William Machol and Edwin B, Koenik, the latter of 1190 Madhsun avenae.

Thompson Bross, San Francisco, Cal., has taken the agency in northern Culifornia for the Johnson trucks, made by its Johnson Service t'ampant, Milwaukee, Wis. The new concern plans the execution of a garage and service station

The Peerless Motor Car Company of New England announces the opening of a branch and nervice station at 222 Broad street, Providence, R. L. which will be in charge of J. W. Breese, a factory representative



Section of the Assembly Room of the Lippard-Siewart Motor Far Company, Hoffsin, N. V., Depicting a Fleet of Commercial Vehicles Heling Made Rendy for the Room,

The Findelsen & Krupf Manufacturing Company, Chicago, has secured the Hall Meter Supplies Company of Toronto, Can. as its Canadian distributor of the Bayth di carburetor, also the U. C. Hall Electric Company, Cheveland, O., to represent it by the certific property of the Company of the Comp

The Postles-Prouse Company, Wilmington, Del. has been ormanized in take over the bossisses formerly conducted by Col. Postles. The offices are President, G. P. Postles, vice president and general morager, Shanley D. Prouse; secretary and 'resurer, John H. Willi.

The International Motor Company, New York City, maker of the Mark, Saurer and Hewitt line, hos uponed offices in the Camber building, Allami, Ga., making this City headquarters for the Suntheast. It is proposed to establish a southern branch and service station in the near future.

The standard Waves Pabrie Lompans, Worcester, Massinake of Mullifeston, has increased its selling branches, having closed with Petry-Cassidy, Inc., 1418 Vine street, Publishia, as affect in Pennsylvania and the South, also James G. Barciav, 126 Main street, Buffalo, N. Y., who will not as sales agree "broade central and western New York State."

The Hond Bres, Nucleic Limpany, Kdiningson, Mich. maker of interestal joints, is running its plant meth and day in order or interestal joints, is running its plant meth and day in order. In the factory were made and now incombinery installed last summer, but even with the catsory for its surprise dupling all of a delitional structures are expected in the near fature.

The Atterbary Motor Far Company, Huffade N. A. hav eslabelled tendinatters for its product at its broadley place, burs. Motor Track Company of Connected and will have subassectes in New Lendon, New Haven and Waterbary, Edward J. Lees is manager, and R. K. Swett placed the force

The Vev bark Lukefrening DH tampuny's business has a friends set rapidly during the heat year, especially on the Pacific Coast. But H has been found necessary to spen a branch offer at Scattle, Wissh, at the correct of Virginia and Bailvenaria, N 3, the address of which becauter the spend to New Jerks, B 3, the address of which becauter with a 5729 New Jerks.

The Lipport-Newley Water for Company, Buffalor N. N., and Doubser that the following conserver and find builded are founding in line of commercial vehicles. Serving Place Garage, Brookly N. Newlet Power Wager Company, Newark, Bryden Monter Campany, Doughkeepele, N. V. W. H. Hennerding Serving Company, Compan

The Pord Mater Company, twitted, exterialized another lates detaultion of Ford Sweles serveity, and the accompanient illustration presents the party which was photographed after terodificialize at one of the prominent horizing where the members were sweets of the company. An inspection of the plant followed, after which the ports lunctual in the Log challenge of the company of t

niau acted as toustmoster at a banquet in the evening. The visitors departed shortly after midnight on a special train for Grand Rapids, Mich.

The Auto-absolutes Company, 146, 81 Johns, N. R. bard filed notice of incorporation. The entirely stock is 3500 and the incorporators include J. Pracer Gregory, Charmes B. Allen, each C. Weimer, A. Ernest Keertl, William C. Bothwell, Harold A. Allison, F. J. Likley and William McLaughtin. The South Company of the Compan

The American Locumotter Lampuny, New York City and Probleme, II. In a appointed the fullowing agence. II. II. Dennis, Tolesto, G. T. A. Crissov, Toronto, Canada; Franklin Auto & Supply Computy, Mibraukov, W. S.; Park Auto Company, Eric, Form, Auto Seles Sompany, San Francisco, Cal. Rissov, Company, Mibraukov, M. R.; Rissov, C. R.; Rissov, R.; Rissov, C. R.; Rissov, R

The Lippard-Stewart Matter Lat tempany, Buffalo, N. Y., an ounces that Clusters. It Dubquist has been secured as assistant which engineer. He has been entered with the Interest of the automatic between Erreduced to that he occupied a similar position with the Velle Motor Veltele Fougary. He well known among automatile engineers as a man of un-

The Condyser Title A Robber Company's Philadelphila branch is now heavied in one quarter set 20°22. North Broad street and its described in an accompanying illustration. The structure is there solveds in theirist and its terr, outsia from well inflation, in the arrangement of the basement, special through ins been sixen to instructure the theory in the property of the property of



New Home of the Philadelphio Branch of the Goodyear Tire & Rubber Company, Akren, U., Which is Thuroughly Modern and Contains Every Conveniences for Handling Tires, Etc.

MOTOR LINE TO HANDLE MILK.

The Belt Line Automobile Traction Company, operating between Ninevah, Edinburgh, Shelbyville and Blue Ridge, Ind., beld a meeting recently and decided to make stope and pick up cream from farmers living along the route and deliver it to consamers in Shelbyville, the only provision being made was that the business shall warrant the stops. The company was organized has July.

TRANSPORT FUEL BY TRUCKS.

Among the large corporations replacing their horse drawn equipment with motor propeited weblode is the Simdard OH Company of New York City which materials a large number of branches throughout the country. The vehicles are employed to hauf fuel oil which is carried in special tanks and in the accompanying illustration is depicted a type of truck utilized for this purpose. It will be noted that the chassis is fitted with special sills for the purpose of distributing the weight evenly and that access to the tank is by means of a ladder. When the containers try. The Stephenson company produces a line of mechanical transports, the name of which has been changed to Utility.

EXPRESS COMPANY ADOPTS TRUCKS.

The fact that the leading express companies are replacing the horse drawe equipment with the mechanical transport is attracting the attention of business men throughout the country, who realize that the express concerns have investigated the practical features of the automobile before adopting the more progressive form of transportation. An nouncement is made that the American Express Company has decided to place in service a number of trucks in Portland, Lewiston and Bangor, Me.

LEE TIRES GIVE BIG MILEAGE.

Pneumatic tires are utilized for commercial vehicles of certain carrying capacities and the Auto Car Service Company has been testing for some time past the Lee puncture



Type of Chassis Ullised by the Standard Oll Company for Transporting Dil Fuel at Its Numerous Branches,

are full the truck is subjected to considerable weight, but the many automobiles in service have demonstrated their ability to haul such loads casily as well as with decided economy over the horse drawn equipment. The machine illustrated is in service at Kansas City. Mo

TO EXPERIMENT WITH ENGINES.

What is termed a gasoline motor experimental station has been erected at the junction of the Rock Island and Denver & Rio Grande Railroad tracks in Roswell, Col. It is understood that the heaviest stockholder in the enterprise is Richard T. Robinson, Jr., who, with his father, is interested financially in the J. I. Case. Threshing Machine Company, Racine, Wis. Edward Rorke is superintendent of the plant.

The recent announcement that the Case concern was about to engage in the production of commercial vehicles and the reported purchase of the Stephenson Motor Car Company, Milwaukee, Wis, by this concern, makes the new experimental station of more or less interest to the indus-

proof shoe, made by the Lee Tire & Rubber Company, Consohocken, Penn. Reports from the Philadelphia branch of the Auto Car Service Company show that 29 Lee tires have given a combined service of 153,901 miles, or an average of 5307 miles at the without a puncture or a blowout.

VELIE TRUCK COST ESTIMATES.

in order that prospective purchasers of commercial vehicles may have a fair estimate of the operating expense of two and three-ton trucks, Morton H. Luce, manager of the Chicago branch of the Velle Moor Vehicle Company, Moline, III, has compiled a schedule of estimates. In these the machine is charged off at the end of sever pars, and a very liberal allowance is made for upkeep as well as depreciation.

A. D. Frost has been appointed manager of the newly established Alco branch in New York City, and will have charge of the service building on Jackson avenue, Long, Island City, N. Y. F. A. Crooks is assistant manager

ADAMS TRUCK HALLS EXPLOSIVES

Mechanical transports are utilized in many industries, hut what is believed to be a new use for the automobile is that of hauling dangerous explosives in large quantities. The independent Torpedo Company transports large quantities of nitro-giyeerine from one state to another and until recently horses were employed in this dangerous work. These have now been replaced by an Adams truck, made when the company the property of the property of the property of the property of the presented of the presented the vehicle carrying 729 quarts of the highly explosive fluid.

The chassis is a regular stock production, the only extra caulipment being Swinchart cellular non-skid tires. The regular hody is lined with a pan, in which ress a special body having a number of vompartments for holding the cans containing the explosive. This inner or special body is also equipped with a pan, which guards against the possibility of any of the fluid leaking into the mechanism of the machine should a can develop a teak.

DOELGER SELLS LAST HORSES.

Peter Boelger, the New York brewer, recently advertised for saie the last horses in his stables, and within 30 days the entire delivery service of the brewery will be by motor, electric trucks of the General Vehirle make being used mostly. When Mr. Doelger purchased his first motor truck three years ago, he was operating 70 horse trucks, and had 175 horses in his stables. He gradually disposed of the animals and substituted mechanical transports, his first experimental purchase proving a great success, and with the sale of his last horses he will be the first brewer to trust exclusively to motor trucks for all purposes. For utility work around the brewery yard, the General Vehicle Company of Long island City. Is designing a special waron.

pany of Long island City, is designing a special wagon.

Mr. Dedger now uses 38 electric trucks, with 16 more
ordered, and eight gas trucks, making a total of 62. The
two-story garage which was exceed last year is to receive
three additional stories, giving it a capacity of 85 trucks,
considerably. While the garage will have 26 more metals
than were operated under the horse regime, the space it
will occupy is much less, as much so that the demolition of
the old horse stables will leave a space equal to 10 city lots
for the extension of the brewery.

MOTZ TIRES IN MAIL SERVICE.

A light delivery motor car now makes the rounds of the mail boxes in Washington, D. C., the United States government having decided the success demonstrated in other fields is sufficient to warrant the adoption of the automobile in this work. The car shown is an accompanying Illustration covers a distance of 105 miles a day, making 998 stops for the collection of

mail. Conservatively estimating the number of horses it can replace at four, it readily can he seen what a hig savlng the new system means to the government.

Service is expected regardless of roads or weather, and in this respect this little can has proved absolutely dependable. Probably



Wall Wagon Fitted with Mota Cushion Tires,

one of the largest factors in delaying the adoption of the light quick delivery ear for mail collection was the tire problem. The motor would not stand the shock of hard tires, and the question of pneumatics blinged upon the matter of expense.

In this instance the problem appears to have been solved through the use of the Most high efficiency cushion tire, and made by the Most Tire & Rubber Company, Akron, O. This is held to be puncture proof and as resilient as a properly inflated pneumatic, the latter quality being due to the double treads, under-cut aides and sinstvise bridges that chardiges that char-diges that

NEW ORLEANS WANTS TRUCKS

The Sewerage and Water Board of New Orleans, La., is to have a motor equipment, bids having been saked for furnishing three machines, either two runabouts and one truck, or two trucks and one runabout.



Adams Truck in Service with the Independent Torpedo Company Hauling 720 Quarts of Micro-Glyrerine... The Vehicle in Fitted with Special Body, Having Compariments for Carrying the Cana.

CONSTRUCTIONAL FEATURES OF ARIES TRUCK.

THE steel shod truck of France, is the slogan under which the Aries, made by the Aries Manufacturing Company of Villeneuve-ia-Garenne, France, is being introduced to the American public by J. Jaccard & Co., 213 West 69th street, New York City. This implies much more than would appear from a casual rendition of the statement. Great emphasis is placed upon the steel tires, but equal force is applied to the statement that this is a truck from France. It is maintained that France is the mother country of the automobile and that it was in that country that the importance of the mechanical transport for heavy duty work was first realized. As a result it is claimed that the problem has been studied with an effort to realize durability and economy. Whether or not America is willing to concede this position, it must be granted that the designers of the Aries vehicle have paid special attention to detail, and as the Aries company has been manufacturing trucks for 16 years, it will prove of interest to examine the workmanship displayed in this seven-ton carrier.

The motor is a four-cyllader, four-cycle, water-cooled unit rated by the maker at 40 horse-power. The bore is five inches and the stroke 5.75. The location is in front under a hood, although this is subject to option, the maker following the Continental practise of piacing the engine uncambains through the usual arrangement of valve lifters. Ample provision has been made for the lagress and egress of all gases, and all water, oil and gasoline pipes are large and substantial. Special care has been taken to provide liberal water plackets, which also surround the valve cages, thereby effectually cooling that portion of the cylinder which is subjected to the most severe heat. Small tubing or piping connections have been entirely eliminated and ijoints have been given particular attention in order that there shall be no danger of these connections becoming disjointed or broken.

ignition is by Booch high-tension magneto, placed on the exhaust side. The carburetor is of special design, fool proof, automatic, and so constructed as to operate successfully with gasoline, benzol, naphtha or alcohol. This is tocated with the water jump on the inter side. The lubrication system also is automatic, a pump being employed to force the oil through the cranissal to all working parts of the motor. A sight feed on the dash informs the operator as to the condition of the supply at all times. The circulating water is kept in motion by means of a gear driven pump. An extra large radiator of the tubular type is mounted forward of the engine, cooling being aided further by a six-biaded fan directly behind this.



Semi-Plan View of Aries Chassis, Indicating Simplicity and Sturdy Construction.

der the floor when it is so desired. In either case, full accessibility is provided, the mounting being on a special steel sub-frame, boiled against hard wood members which are in turn boiled to the side frame proper, permitting easy removat. In addition, it should be remarked that this form of suspension is designed to present a cushioning effect and completely elimitate all minor vibrations.

While the subject of metal tires will be taken up later, it is worthy of note that the maker has resilized fully the special strains, unusual conditions and excessive thrations which must be overcome when these are employed, and as it has been enzaged in studying this phase of the problem for the past seven years, the result of its experimentation is to be seen throughout the entire construction and assembly. For instance, the motor has been strenkthened and siffered at many points. The entire crankcase is made of steed, ear-fully designed and admirably proportioned, and despite this strength, it weighs but little more than aluminum eastlings of the usual construction. The base of the crankcase is carried up to the frame for the motor support, and a staunch cross member makes provision for the rear of the motor and flywhere.

The cylinders are cast in pairs of a special grade of material and arranged vertically. Valves are located on both sides of the cylinder head, being operated from two

The clutch is the dry disc type, employing 39 discs, and alternating with bronze and steel. Adjustment is provided in the nature of a slight movement of a nut on a fine pitch screw. It is claimed by the maker that it requires absolutely no attention and performs its work in a highly satisfactory manner. The transmission is of the selective sliding gear type, affording three forward speeds and reverse. The whole transmission and differential is enclosed in a cast steel case,

auspended at three points on the chassis in such manner that no deformation can after the alignment. The ends of this casing extend to form shelves or bearings for the Jackshaft, while the end of the rights idde is fitted with a projection forming an anchorage for the heavy working brake, the drum of which is in a reverse at the side of the portion of the easing occupied by the differential. All gears are of nickel steel.

While on the subject of brakes, it may be stated that two sets are provided, one on the differential as explained, and the other acting on the evar wheels. There latter are of the external contracting type. They are so arranged that when the were is operated, adjustable shoes are applied automatically to the surface of initial tires, as indicated by the accompanying illustration.

The frame is of the Longwy channel steel, strengthened by lars and cross sections. The springs are very long, strong and flexible, with swivel shackles and lubricating bearings. All are semi-elliptic. The forward members are utached firmly to the frame at one end and coupled by a swivel shackle at the other, while the rear members are shackled at both ends. This method of suspension is held by the maker to permit of free up-and-down movement without any warping or twisting of the spring plates themselves. In addition, it is claimed that the steel shod Aries

rides as easily as any other with rubber tires, by reason of the fact that flexibility of the suspension effectually absorbs all road shocks and much of the vibration.

The wheels are of the artillery wood type, but with the



Steel Tired Rear Wheel and Braking Mechanism on Aries Truck.

hubs supplied with unusually deep flances, thus considerably increasing the sturdiness of the assembly. The spokes are made of a hard and fibrous wood, air dried by a natural process. Aboutlety no kill offeed wood is used. The spokes are cut in conformity with the grain of the wood, so that the grain follows the straight line of the strains in them with accuracy. The whole is bound together by a specially constructed rim or fellow.

This latter is built up of small pieces of Freich elim, and each section is subjected to a thorough examination herefore being assembled. It is understood that the wood from which these are constructed is of such close grain, hard fibre and solid structure that it is one of the few woods which will not float it water. It is pointed out that this characteristic should convey some blea of the strength and strain-resisting qualities inherit in it.

The Aries tires, for which so much is claimed, are made of Cremos steed, which is held to pussess the quality of beling neither too hard nor too soft, and of heing sufficiently tough to withstand constain hammering in service without cracking, and without stretching or expanding. It is held that when these are once placed on a wheel, they need no further attention.

Inasmuch us this particular brand of steel cannot be

weided, the tires are cut from a solid billet, which has been brought to a predetermined heat. and a mandrill forced through the centre, thus leaving the billet in the form of a heavy washer. This is next placed in a special machine, and tapering mandrills are driven through the centre, expanding the whole and compressing the fibre of the metal which eventually is to form the tire. This operation is repeated, with heating between each operation, until the billet roughly assumes the shape desired, after which it is placed between two rollers and held under constant

pressure. These proceed to roll the tire flatter and flatter, and at the same time still further compress the fibre, driving the molecules into closer relation with each other, until they are ready for the special hydraulic press. This con-

sists of many hydraulic pistons placed radially around the risk of the wheel. These work in perfect unlong and subject the rin to pressure uniformly throughout its entire circumference, and kneed the steel ties into the wooden felice. This operation is repeated 14 times, thus tightening the tire on the wine repeated with the ring of the properties of the wheel in the machine, until wood and metal form one compact mass.

After the tire is firmly sented, binding the wheel under great pressure, the entire assembly is trued up on a lath, thus linaring that both wheel and rim are absolutely concentric and general reference of the wheel, also by hydraulle pressure, insuring uniform radial strain on the spokes. This central hub tends to force the spokes outward against the linward pressure of the specially applied rims, and at all times the compression under which the spokes are beld maintains the wheel absolutely time, circular, and free from warp or twist

It is claimed that no Aries tires have ever been worn out in service, although many of them have covered great mileage, in some cases as bigh as \$9,000 miles. The Aries company guarantees them for no less than 100,000 kilometers (60,000 miles). The company is prepared to furnish an extra rim fitted with rubber block tires for winter service, If desired.

MORE ROOM FOR TRACTORS.

Because of the increasing demand for its gasoline tractors, the Fairbanks Morse Company, Chicago, has decided to enlarge its present factory facilities at Heloit, Wis. The addition will be 80 by 130 feet. A new brass (oundry also is beling erected.

MOTORS TO COLLECT GARBAGE.

If the plans of the Knox Automobile Company of Sprinsfield, Mass., are carried out, that rity, which has had some trouble with its garbage diaposal system, will collect garbage by motor trucks instead of by horse carts. A modern incineration plant is to be installed, and the feeling is that with this should go quicker and more modern methods of collection.

TRUCK LINE IN WISCONSIN.

A motor transportation service is to be placed in Sheboygan, Wis., to carry passengers and freight between that city and the towns in the vicinity. Local capital is in-



Side View of Aries Seven-Ton Chassis, Rendy for Hody Installation,

terested, and the service is expected to solve to a great extent the problem of securing quick and inexpensive transportation facilities. Two buses for passengers and two trucks for freight will form the initial equipment of the line.

MORELAND COMPLETES TEST RUN.

A test run which will prove of more than ordinary interest was undertaken recently by Homer Crouch of the Moreland Motor Truck Company, Los Angeles, Cal., maker of the Moreland distillate truck. The vehicle was of two tons capacity and the run was from Los Angeles to Santa Barbara, a distance of 110 miles, which was accomplished at a cost of 7.1.5 cents for fuel and oil. Crouch was accommanded by C. H. Smith who acted as observed.

This proved to be the first time that a motor truck of this capacity had been over the road through Castitias pass, and in spite of the bad roads no trouble of any nature was experienced. Conditions were fair from Los Angeles to Calabasas, but soon after that point was reached a sand atorm was encountered. The roads in the eastern portion of the pass were hadly cut up and this section called for cautious driving. From the pass to Santa Barhara the surface was in excellent conditions.

Upon its arrival in Santa Barbara, the machine was turned over to A. C. Grant, the local representative of the Union Oil Company, who had no besitancy in accepting delivery when he learned how well the truck had performed on this trial trip. Another vehicle of the same make, but utilizing gasoline for fuel, will repeat the test, in order that more comparative cost fautres may be obtained.

As has been stated the product of the Moreland Motor Truck Company is designed to use distillate, known as California No. 1, for fuel. This is vaporized in a float feed carburetor. The motor is of the four-cylinder, four-cycle, water-cooled type, with cylinders cast en bloc and arranged vertically. The bore is 4.125 inches and the stroke 5.55, giving a railing under the S. A. E. standard of 2.72 horsepower. Cooling is by centrifugal pump, gear driven, and by flat vertical tube radiator. Ignition is by Bosch magneto and dry cells.

The clutch is a cone member. The transmission is selective, affording three speeds forward and reverse. Plnai drive is by side chains. Two sets of brakes are fitted, contracting on jackshaft and internal expanding on rear wheels. The frame is of speela alloy channel steel, but riveted and with gusset plates on corners. Springs are semi-elliptic front and rear, with auxiliary springs over the rear axle. Three are 34 by four-inch slight, solid, in front, and 34 by three dual in rear. The wheelbase is either 10 or 12 feet, with tread in front 55 inches and in the rear 64.

BOSTON TRUCK ASSOCIATION.

The Boston Commercial Motor Vehicle Association held its annual meeting recently and elected directors as follows: C. F. Gilmore, agent for Federal and Dayton; A. P. Underhill, Knox; J. S. Hathaway, White; A. T. Fuiler, Packard; L. B. Butler, G. M. C.; Day Baker, T. V. Filler, Baker was made treasurer, and Chester 1. Camphell, the show promoter, secretary.

NEW G. M. C. CHASSIS.

The General Motors Truck Company, Detroit, has brought out a new nudersiung G. M. C. chausis, which is expected to allow loading and unloading of heavy materials with ease. This is accomplished by suspending the springs differently than with other models, and by hringing the chassis frame and body lower to the ground. The springs are placed under the axies, thereby gaining space taken by them in the standard construction. In addition to this, the frame is brought still lower, the side embers being raised over the axies. This type of chassis will be made in the 3.5 and five-ton epageaties.

COLLEGE COURSE IN TRUCK DESIGN.

The Remasslaer Polytechnic Institute of Troy, N. Y., is to establish a course in motor truck design. It will be very thorough in its work and will form a part of the regular mechanical vacquienering course, being given to students in the senior year. R. L. Streeter, assistant professor of machanical engineering at the institute who advocated the course and secured its inclusion in the curriculum, will coaduct it. Theory and practice will be covered, and the aims will be to enable the students to make a light, economical design which will have the gravetes reliability.

SIX ROADSTERS FOR MILWAUKEE.

Milwaukee, Wis, has authorized the purchase of six roadsters at a cost of not more than \$1000 each. They will be used by the six assistant chiefs of the fire department. The purchase was recommended by the fire and police committee, and the cars are to be bought in 30 days. It is expected that the department will be furnished with moore apparatus in the near future, though nothing definite bas here does not not be a supermitten to the cars of the

MAIL AUTO FOR SYRACUSE.

Syracuse, N. Y., is to have a mail automobile, the local postmaster having been authorized to purchase a thirtough one of the collectors. In a test made last full a collector opened 65 mail boxes in 85 minutes, and covered of 35 miles. With a horse the same trip took three hours. An allowance of \$60 \times month is made for maintenance.

RACINE'S CHEMICAL CAR.

Racine, Wis., recently purchased a chemical and hose car for use in the central station. It has a motor of a horsepower, and is capable of speeds up to 50 miles an hour. The free department economized in purchasing the machine by fitting it up with equipment taken from a horse drawn chemical wagon.

BUS SERVICE IN NEW HAVEN.

New Haven, Conn., which has not been quite satisfied with the automobile 'hus line running out Orange street, is to have a new company which will operate modern vehicles. The concern is being organized with a capital of \$60,000, and the plans call for the purchase of six cars. One of the type which is to be bought was tried out on the route recently, and was found to ride much better and have more speed than the ones now in service.

CARS FOR THE CIRCUS PARADE.

The Herhert A. Kline Show, a circus with headquarters in Filint, Mich, is operating two Bulcks in its parade. But contain compressed air calliopes guaranteed to make as much noise as the steam variety with the usual economy that goes with motor operation. The circus is having a Cole car built specially for its use.

PITTSBURG BUYING MACHINES.

The city of Pittshurg, Penn., recently placed orders for six machines, three of which will be used by the police department as patrols, and three by the highways department for handling hot asphalt.

The TRUCK Devoted to Motor Driven Business Vehicles of All Classes.

VOL. III

PAWTUCKET, R. I., JUNE, 1912

No. 6

BREWERY DELIVERY BY ELECTRIC TRUCKS.

Peter Doelger Eliminates Horses in Metropolitan Plant and Builds Model Garage to House His Vehicles, Reducing Cost More Than 25 Per Cent., Saving Heavy Ground Rental and Permitting Large Expansion.

By William W. Scott.

If HE subject of highway transportation is receiving greater and more carefully systematized attention adily, institutarly by those who must maintain their own haulage service. It was the demand for better roads that brought about the nation-wide demand for larprovement. It is the personal concern through the payment of heavy charges, and the general desirt to economize that is impelling study and analysis of conditions, with a view of applying system, because method that will determine cost to the smallest fraction of a cent to a given unit is imperative with all large enterprises of the day. It is this knowledge of expense that is promoting the study of the utility of the mechanical vehicle for all works.

It is not lovical to make comparisons of serv-Ice under different conditions but it is extremeiy practical to contrast differing service on the basis of cost, Or, to but it another way, to compare same work accomplished by two methods with regard to economy of time and money. In production utilization volume must always be consid-

The southern and the so

ered. New York Electric Trucks of Five Tone Capacity, One Loaded for Delivery and the Diber Return. Rand for the preis the commercial—lag with a Freight of "Empires," at Entrance to Peter Dociger's Reewesty, 25th Street, artiptions, all of centre of the composers Vork City.

thent, its business interests are proportionate to its population so far as community demands are concerned, and its manufacturing and commerce necessitate a volume of haulage that is necessarily larger than in any other community. But the business districts of New York are the older portions of the city, with many of the streets comparatively marrow. These cannot be widered save at great expense. So far as possible they have been relieved from surface railroad traffic congestion, but there is constant increase. of vehicular transportation during the business hours of the day.

Were it possible to equalize the traffic the condition

might be greatly relieved, because there are many hours when these thoroughfares are practically deserted. From daylight until early exening the great tide of vthelices surges through the arrow sirevis, the current in each being alternately stopped and started by the poller to permit the crossing at intersecting ways. There is not much delay from the swarms of pedestrians. They have long since learned to make the most of brief cessations of traffic, or have herome adept at dodging through mazes of animals, wagons, carts, carriages, motors and surface cars.

It must not be assumed that there is no recognition of conditions or deavor made to expedite the progress of the vehicles. To the contrary there is a very carefully determined regulation and a large number of police patrolmen on duty to enforce observance of the requirements. Not only this, there is with rare exceptions careful re-

show that so far as municipal control and supervision is concerned there are decidedly practical results. As a matter of fart it would be difficult to better regulate the traffic unless it were possible to have certain highways for different classifications as to sue-of-that there mixth is no idealy between specified points. So far as type and size of transport, character and properties of load, and variance of speed may enter into the problem, it may be stared that there is no discrimination and all have evenly right and opportubly. There are no limitations as to slowness of pace, but the safety of the people demands that there be restrictions as to speed

These conditions obtain very generally in other largecities of the country, and while there is not the same degree of congestion, perhaps, there is not the same charater of supervision, so that there is probably a proportionality larger actual loss from lack of systematic control than in New York. In the communities relatively samiler, especially the older cities, the industries are usually grouped, as are the commercial enterprises, so that there are highways in which to traffic may be very heavy and congested.

As the communities increase in population the business correspondingly develops. The hanlage is extended very generally, but with large interests there must be a central location from which delivery may be made, or shipping points to and from which hanlage is required. In many instances the requirements of competition imped delivery to the suburbs or to adjacent towas and cities. This is a condition unusually acute in New York. Besides the city itself it is necessary to include in the delivery zone a number of the cities and towns within a radius of roughly 30 miles. This is probably the extreme, although with some of the principal stores and concerns in other lines this may be a very modest estimate. There is, however, a limit to what assumed that there is not a sufficient attention given to the creatures. There is a need of the best service that can be maintained and the requirements are becoming more and more exacting.

Within a comparatively brief period, less than 18 months to be more specific, several of the largest breveries in the metropolis have turned from horses to motor vebl-cies, and it is only a question of time before practically all the delivery from them will be made without horses. There may be numerous conditions realized by the transition that will be advantageous, but of these none need be considered in this article other than economy, and this despite the fact that with the elimination of horses from haulage in New York it is not too much to say that the efficiency of the trucks would be increased practically 100 per cent.

Of these breweries that which will be considered in that of Peter Doelger, located at 55th and 56th strees, Pirat avenue and Avenue A, which is on a site increasing very rapidly in value, for this is what may now be considered a part of the "downtown" section. This is not the largest brewing establishment in the city but it has long been noted for the qualify of its products, the greater part of which was, until within two years, sold practically in New York and vicinace. Today the delivery from this brewery is made



Six Five-Ton General Vehicle Electric Trucks at the Londing Pintform of the Doelger Brewery in Readiness in Receive the Feelghts of Kega and Barrels.

may be regarded as direct delivery, and some of the firms have established distributing centres to which what is referred to as "transfer" of goods is made, and thence distribution to the customers.

No class of delivery will better serve as an example than that made by the brewerles of New York, which is not only constant hat exacting, both within and without the city. There are numerous industries of this character in the eries are the central points from which distribution is made, and with customers in all directions and sections it is assential that they be given a satisfactory attention. Competition is decidedly keen and to satisfy patrons, all obse being equal, there must not only be systematic delivery but an emergency service that will be prompt and reliable.

While the major part of the breweries today employ horses their delivery systems are in a transitory condition, as the animals are being supplanted by trucks driven by mechanical means. This is not meant to limply that these concerns are willing to make sacrifice. To the contrary, practically every brewery stable is a model of its kind and the animals are the best that money can procure, all equipment being of a similar high grade. Neither should it be entirely by mechanical wagons, and of the 52 in service when the writer visited the garage 42 were electric, and 12 more electrics were to be delivered in groups of four durins May, June and July, so that by Aug. 1 it was expected that the total number available would be 54.

The attention of the writer was directed especially toward the electric installation because of the degree of salifaction expressed with the vehicles and the service obtained with them. That the borses owned by the firm had been disposed of and entire reliance made upon the motor truck was a sufficient indication of the certain dependability of the service wagons, this having been determined by practical use under every condition—not for months, but for years. All of these electric trucks and wagons are the product of the General Vehicle Company, Long Island City, N. Y., which concern has in service in the metropolis alone more than 1000 machines.

To understand the delivery of this brewery it is necessary to detail some facts relative to its production, its leation and its requirements because of probable expansion. As has been stated the brewery is in a section of the city in which property is rapidly increasing in value. It is posible to purchase additional resi estate, but this means the investment of more caulida, which might be better used in



Conditions for Storage and Care of the Electric Trucks at the Doeiger Brewery Garage, Evidencing the Ideal Manner of Maintenance and Protection,

the manufacturing. Then, logically, with considerable area devoted to stables, these being upon the land adjoint the brewery property, any expansion of the brewery would import the utilization of the land on which the stables and and the removable of the barns to the nearest point available.

For years the hrewery products were sold in kegs and barrels and distributed to customers about the city. The demand for bottled products was such that it was decided to install a bottling plant, and this was done. The plant is a model and is maintained by the company to be the finear of its kind in the world. It is beld to be not only as sanitary as the operating room of a hospital, but in every possible manner labor has been economized. The plant has a capacity of 60,000 bottles a day under normal conditions and this may be largely increased, perhaps doubled, daily. But the demand for these products increased so rapidly that it was decided to later on enlarge the bottling plant, which will probably be done the coming summer or autumn, and this small side the use of more of the available property.

The site of the bottling establishment was originally a stable, and with the decision to erect the building an order was given for electric trucks and wagons to take the place of the horses that were sheltered by it. Whether or not the necessity for the new building compelled the use of trucks or the purchase of additional real estate and the building of another stable, is not a subject for discussion. The fart remains that the vehicles were ordered and delivered.

The brewery had up to that time owned seven electric wagons, all of sev tons capacity. The first, of these was purchased in 1903 and it was placed in service that was regarded as extreme. The experience with this vehicle was not uncertain. It was an early type and while extremely useful and dependable it did not and could not receive the attentions and care that was desirable to obtain from it the fullest and best results. It was not until six years had elapsed, in 1309, that three more tracks were bought, and when the change was decided on the brewery purchased three others, making a total of seven in use.



Interior of the Model Garage in the Doelger Brewery hard, Shawing the Ground Ploor and the Charging Board, Which Will Charge 24 Electrics at One Time.



Exterior of the Doelger Model Fleeproof Garage, with Space for 48 Electric Trucks, Which and the walls are heavy enough to is to its Enlarged to Flee Mories to Accommodate 120 Machines, Occuping Part of a carry them upward any reason-Pormer Wagon 1 ard.

It will be seen, however, that the extended experience was obtained with the first machine and that it had been owned practically seven years before the next group of three was bought. This trio of trucks had been used something more than a sear before the others were purchased. While it is entirely practical to as efficiently maintain a single electric vehicle as a large number, it must be admitted that as the number is increased the cost for each ought to lesson. There are many reasons for this, some of which must be apparent, so it may be stated that the conclusions reached from the experience with these machines were based on approximately a larger expense a vehicle than is now expended for similar service.

The first order for trucks delivered in 1911 was for 16 five-ton machines, and this was supplemented by another for eight 3.5-ton trucks, so that the equipment at the end of the year was 31 vehicles. The first truck had been sheltered in a part of a stable set aside for it, there being no special provision for it. With the addition of the next six unrhased no senarate building was required, but with the

ordering of the 24 bought in 1911 the garaging of the machine became a proposition of large proportions. Meantime 10 gasoline trucks had been bought for a service for which it was believed these vehicles were especially adapted and it was necessary to provide for these as well.

The main brewery buildings had been erected with a court back of them entered through arches from 55th street, this court affording light and a large storage space for wagons. With the use of wagons it was customary to utilize this snace constantly, in this court it was decided to build a garage \$5 by 100 feet, of two stories. This building was planned to have storage space for 24 trucks to a floor, and allowing all the necessary area for shifting, washing, work on the machines, the elevator shaft, charging installation, and other requirements, it

was believed this would be ample. This building, by the way, is one of the finest structures of the kind in New York. No expense was suared to make it fireproof. There is practically nothing inflammable ensering into it. The walls are of brick, the roof is practically indestructible, the lower floor is rement and the second floor is reinforced concrete, supported by large columns protected against fire. The stairs are of tron and the elevator shaft is enclosed to insure against a spread of flames. The ejectric installations have been made with extreme care and every precaution has been taken to guard against fire loss and to obtain the lowest rate of insurance. The building was built with a view to future needs carry them upward any reasonable number of storles. Nothing

has been neglected that will afford the necessary or desirable facilities for earing for and maintaining the trucks. There is a battery department for the repair and maintenance of the batteries, a repair shop adequate for the work that is needed to properly maintain the trucks, and a storage for whatever supplies and parts are not obtainable as occasion may demand.

The garage was believed to be sufficient for immediate requirements and so it was, but the development of the bot-thing department of the business was remarkable. The products are not sold at retail, but to dealers who retail and deliver them, and there are today no less than 1600 different customers who must be supplied whenever their business demands delivery, some of them receiving deliveries daily. Naturally the weather influences demand and It may be sald that there are periods when the consumption is three times as large as at others. This fluctuation cannot be varied and obviously it must be provided for by sufficient delivery facilities to meet any requirement or by additional work by the drivers and trucks.



Section of the of the Two Remnining Doeiger Wagon Yards, Where Horse Trucks Are Offerred for Sale, Showing the Valuable Aren Made Available for Expansion of the Brewery Through the Lse of Electric Wagons,



Front of the Borger Work is Great; Showing the Limited Loading and Revelving Sparce, a much larger opportunity Sparce, Where Work is Great; Economiced by the Riccite Wagons—The stables at for increased business than existed the High 'ter Temperaril') ted for Storage and tree 'Astalible for Espansion. Defore the horse equipment was

The experience during the year of 1911 was no exceedingly satisfactory so far as the electric trucks were concerned that an order for 16 few-ton machines was placed and this was supplemented by an order for 12 more, making a total of 2s for 1912, and of these eight are yet to be delivered. With the sale of five of the trucks built prior to 1911 there are now 46 machines in service and when the deliveries to be made are received the equipment will be increased to 54 electrics. With the capacity of the garage practically reached it has been decided to build three additional stories (the first deviden was two), which will increase the capacity to 12s trucks, this being as large a number as will be required for several years at least.

In consideration of this delivery equipment it will be noted that this garage, 85 by 100 feet ground area, will not only shelter 120 tracks, but will include every facilities necessary for maintaining them. In contrast with this the one-story brick horse harn that sheltered 135 horses covered an area 100 by 200 feet, and besides this three waren yards and a blacksmith shop with large strond space were absolutely increasary. It may be pointed out that the wagon yard space was just as valuable as the land on which the brewery buildings themselves stand and the actual rental paid for its new was very large because, aside from its nominal increase, the capital it represented was unproductive. That is to asy, the interest on the actual value.

tion of the land, and the taxes paid, as well as the loss through the withdrawal of the entire amount from the business, must be regarded as the reutal of the irronerty.

It will be argued that wagon yards were necessary, that this was a condition peculiar to the conduct of a husbures of this character and that it would be impossible to obtain similar facilities at a lesser cost. But it will be observed that the bushiess demanded the erection of the bortling establishment, which made provided ample garaging facilities and abundant opportunity for expansion. Not only this, the land

on which the stable now stands and two of the wagon yards are now available for building or may be disposed of. It as are is equal to 10 full city, building loss, the ground rental of which may be asked. During the visit of the writer in one of the wagon yards and one of the stable sections was pited seven months' supply of coal for the brevery, purchased in anticipation of a shortase and interessed of pice as a result of the strike of miners and cessation of mining.

Were this property sold there would be the realization of the money it is worth, there would be a saving in taxes, and there will be, with the enlargement of the Barker, a much larger opportunity. The Nashler at Johnston. He was a saving in the case of the saving and the savi

disposed of. Improvements are making to the buildings with a view to having greater storace space, better facilities for loading and unloading, and it is intended to considerably increase its daily production. It will be understood that all of these changes will be practical without purchase of additional land and through the elimination of the animal delivers.

The dally delivery is begun at 3 in the morning at this brewery for many reasons. One is that in the early morning the traffic is lightest and better progress can be made, a matter of importance when it is known that exposure of beer to extremes of heat and cold has a damaging effect. Another is that many routes are long and the hauls are considerable distances. Still another is that the customers can best receive the goods when the patronage is light. The drivers report to the garage and at the time to load It is merely necessary for them to climb on the seats with their beloers and drive from the garage into the street. Here the trucks are lined by pairs in the order of departure and they are backed to the keg department, where two may be loaded shanitaneously. Six minutes is the time usually allowed for the loading of a truck with 50 haif-harrels, the work being performed by the driver and his belper, they taking the barrels from the loading platform where they are rolled from the store house by other workmen. No matter how quickly the work is done the endiess chain of



injerior of the Dociger Bottling Plant, Equipped with the Flacs) Labor-Saving Apparnias—Cae of Electric Wagons in Sceping with the Policy of Economy of Time and

kegs and barrels is always ready and trucks have been loaded at a rate of in an hour without any delay within the store house.

As the loading platform will this year be doubled in length and four trucks may then be loaded at once, it is possible that there will be a considerable saving in time through avoiding some of the delays incident to congestion of traffic—at least with the morning loads. The space for loading at the bottling plant is also limited and here, too, the trucks are lined in palrs and the driver and the heiper of each truck packs into it 140 racks of 24 pint bottlese each. These trucks are covered and the sides are protected against thieves by heavy wire screens, with rear doors that may be locked when the vehicle is left unattended. The trucks that have the longest routes are sent away first and the others follow as quickly as they can be loaded.

The routes are made to best suit the convenience of delivery. Some may have a few large customers and others many small customers, the loads being made up so that there will be the regular orders with such extra containers as judgment dicates should be allowed. As the delivery is made the filled containers are replaced by the "empties" and when the return is made to the brewey there is usually a load carried so far as bulk is concerned, there being sometimes as many as 90 half-barries carried.

The weight of a half-barref filled with beer is about 220 pounds and 50 of these will weigh approximately 11,000 pounds, so it will be seen that this standard load is practically the limitation that judgment would dictate should be carried by a five-ton truck. The 140 racks of bottles is the maximum for a 3.5-ton truck. When horses were utilized a pair drew a truck that carried 50 "halvest" but of course the distance travelled was comparatively small. Some of the animals were not driven more than 12 miles a day, perhaps less, and so they lasted for long periods. But It was necessary for the drivers to often use as many as three teams to cover a route, and it may be assumed that, with a walking pace, the delivery was limited. Besides this there was a limit to the hours the drivers worked.

Then with a heavy load and with limited hours and the slow speed of the borses the routes were necessarily shorter than with the use of the trucks. The capacity of the trucks with reference to mileage is 35, half of the distance loaded, and with allowance for delivery, collection of empites, delays in traffic, etc., all of the trucks are back at the brewery at noon, the starts being from 3 to 4:30 in the morning. Very often it is necessary to send out additional loads, for each driver is required to keep his route supplied, and the trucks are available to the limit of their milieage, while it is practical by "boosting" the battery or shy shifting the battery to send the same vehicle out for an additional delivery, there being an allowance made the driver for the helper and the sextra work performed.

With the very large fluctuation of demand, especially during the heated periods of the year, when the consumption is probably three times what it is during the colder months and the loads are necessarily the maximum, the extra work was very severe for the animals. A first class pair of brewery horses is worth 31206 and the price is increasing constantly. Many die cach year because of the hard work and the linease heat, and when the service is most exacting and they are most needed. Not only this, the capacity of the horses shrinks proportionately. It is the same experience during extreme weather of the winter months, so that for a considerable part of the time the animals can be relied upon for from 60 to 75 per cent, of the normal work.

The electric vehicle has the same capacity at all times so far as the brewery service is concerned, save during the period of the year when the streets are obstructed with snow, for then the combined snowfall of the sidewalks and street railway tracks is piled into the roadways until it is removed. The number of days such street obstruction is really serious are comparatively few, however.

it is very evident that with the splendid equipment in the service of this brewery there is a decided saving, to say nothing of other considerations. When the service consisted of 30 trucks and about 50 horses it was stated by the superintendent of the plant, a business man of splendid ability, that there was then a clear profit of \$25,000 a year through the use of the trucks. By careful comparison of expense it was determined that the average cost for delivering a barrel of heer was 24.75 cents as against 33.70 cents a barrel with the animais, this being 8.95 cents for each barrel. This is a saving of 26.6 per cent., and it is not improbable that this can be or is now somewhat increased by the better knowledge of the machines and the improved facilities for maintaining them. Not only this, the aggregate economy with the full complement of trucks ordered will be considerably in excess of \$50,000 a year, to say nothing of the indirect economies. The total will no doubt exceed \$100,000 a year.

Relative to the work of the trucks it is maintained that the drivers as a rule find their own conditions much limproved as compared with animal service, for when they report for the day the trucks are ready and waiting for them. When the work is concluded they leave them in the garage and have no further responsibility. The men were required to harness and hitch their own horses, cive them attention to protect them while absent from the stables, and on return unhithed them and placed them in their stalls. The stable men gave them the further care necessary. The drivers as a rule are those who have driven horses and know the city and traffic conditions. Delays through accident are seldom and from every point of view the service is at parity with the policy of the management to save labor in every way.

Attention has been directed toward this example hecause a complete transition has been made in delivery service with a material saving in cost, a more reliable and dependable method, a decided economy of valuable land, and making possible a large expansion that could not have been made without greatly increased expense with the continuace of the use of animals. Of these the last three named, all of importance, cannot be measured in actual figures, but their skindicance is evident to any business man.

JACKSON BRINGING OUT TRUCK.

The Jackson Automobile Company, Jackson, Mich., is bringing out a new 30 horsepower light delivery car. It will be equipped with solid tires, and it is stated that a special construction gives the results of pneumatic tires without their use.

NEW OLD RELIABLE FACTORY.

Henry Lee Power Company, Chicago, is to increase the manufacture of its Old Reliable truck, and has erected a three-story building in West Ravenwood, Ill., which gives ample facilities for materially enlarging the output.

TO STUDY MOTOR APPARATUS.

The New York State Association of Fire Chief Engineers is to hold its annual convention at Albany. The dates are uncertain, being originally scheduled as June 18:19, and later proposed to be shifted to June 20:21. It is expected that about 150 fire chiefs and commissioners will be present, and that a large exhibit of motor fire apparatus will be shown. All the manufacturers of such apparatus skip envired to exhibit their machines.

NEW G. M. C. AUTOMATIC DUMPING BODY.

THE growing demand for specially designed dumping bodies has resulted in decided interest in this subject on the part of many manufacturers. One of the latest designs brought to public attention is that produced for G. M. C. 3.5 and five-ton vehicles by the General Motors Truck Company, Detroit, and shown herewith. in this the hody is raised or jowered by the power of the motor, the operation being controlled by two hand levers at the driver's seat. That illustrated is adapted to the handling of coal and similar materials, although the same principle is utifized for loading and unloading lumber.

The mechanism consists of an oil tight gearcase boited to the engine bar cross member, and a separate gear mounted on the clutch shaft. The gears within the case are so arranged that the last, which has a protruding shaft by means of which power is transmitted to the winch, can be brought into mesh with that on the ciutch shaft through the intermediary of either two or three gears, depending upon whether it is desired to raise or lower the hody.

As applied to the dumping body, the power tumbler shaft connects at its rear end to the shaft of a worm, which, together with its worm wheel, is encased in a cast iron, oil tight housing. suspended from two structural steel angles, placed crosswise of the chassis frame. The worm wheel has a shaft protruding from the housing and carrying a spur pinion which meshes with a spur gear keyed to the winch drum shaft. This latter shaft revolves in two plain bearings boited to the upper flanges on the side frame members. At its extreme end chain gears act as sprockets engaging the chain that serves to move the raising beam up or

The pitch of worm and worm wheel is such that in conjunction with a plain thrust bearing used in the worm shaft, the worm and wheel are rendered self-locking. This feature is held to dispense with the necessity for

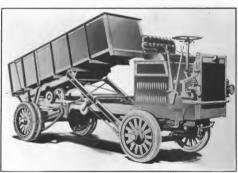
ratchets or hrakes on the winch, or mechanisms operated by this worm to hold the load or to prevent it from turning the winch, when the power drive is not actuated by the motor. Thus to secure movement in either direction it always is necessary to impart the proper direction of rotation to the worm, by the motor,

In shifting the gears in the gearbox, the same merbod of procedure must be observed as when shifting gears in the transmission. The clutch must be disengaged before shifting, and the same thing is true when it is desired to stop or reverse the power. Control of speed of the power drive is accomplished by controlling the speed of the motor. and to some extent by slipping the clutch.

Provision also is made for utilizing the power drive while the truck is in motion, as the gears of the power drive and those of the transmission are not interlocked. This is of particular value when it is desired to spread the material as it is being discharged. This also applies with the device as fitted to iumber bodies, in assisting the load on or off.

in this latter instance the sour gear mentioned as being placed on the worm gear shaft, is replaced by a sprocket on the extension of the worm wheel shaft outside of the chassis frame. This is operated through a roller chain and sprocker on one of the lumber roller shafts. This roller shaft is in turn connected to the rear number roller by means of sprockets and roller chain. The loading and unionding is accomplished in the same manner as the raising and lowering of the dumping body-through shifting the gears in the gearbox on the cross member.

it is maintained that it is possible to install this body and its actuating mechanism on any truck, whether originally intended to receive the power drive or not, provided these vehicles bave a three point suspension cross member. The only possible exception to this, is held to be a vehicle so built with a wheelbase sufficiently short to bring the universal foliats close together and to the cross member, so that there will be no room for the insertion of the gearbox. It is expected that the design will meet with ready accept-



New Type of Automatic Dumping Body, Produced by General Motors Truck Company,

ance by many purchasers. The fact that it is adaptable for loading and unloading makes it of unusual interest.

MOTORS LOWER FIRE RATES.

Mayor Shank of Indianapolis, ind., recently celebrated the lowering of the insurance rates by a municipal parade. The reduction will amount to about \$100,000 annually, and was made by the insurance companies following the addition to the fire equipment of the city of a number of motor vehicles. Apparatus has been installed as follows. Two squad wagons, ladder truck, combination pump and hose, two comhination chemical and hose wagons, and chief's car. Three new fire houses have been built to house the new equipment, and 50 firemen added to the force. The city has been a large purchaser of motors for department use, other branches of the municipal government using machines as follows: Police department, two patrol wagons and touring car; public works, touring car; streets, five runabouts; engineering, two trucks; hospital, two ambulances,

NEWS OF THE COMMERCIAL VEHICLE INDUSTRY.

Goodrich-Diamond Merger of Decided Importance---Splitdorf Reorganization Also of Interest---Many Truck Companies Organized and Ready for Business.

Official autonucement concerning the merger of the Goodrich and Diamond interests, shows that the Diamond Rubber Company, of Akron, O., has been purchased by the B. F. Goodrich Company, of Lee same city, the amount involved being 445,490,900. Accompanying this consolidation the personnel of the board of directors is to be changed slightly as inclinated by the following: Chairman of the board, F. A. Hardy, Chicago; vice chairman, F. A. Mason, Akron; president, B. G. Work; vice president and general manager, A. H. Marks; vice president and works manager, E. C. Shaw; vice president and sales manager, H. E. Raymond; vice president and assistant sales manager, W. B. Miller; secretary, C. B. Raymond; treasurer, W. A. Means; additional members of the board, O. C. Barber and C. C. Goodrich.

The statement issued by the firm of brokers which conducted the negotiations sets forth the details of the transaction as follows:

"Goldman, Sacha & Co., announces for itself and Lehman Bros., New York City, and Kleilwort Sons & Co., London, that arrangements have been completed for the purchase by the B. F. Goodrick Company / New York) and the transfer to it of the property and business of the Diamond Rubber Company. The companies, as is well known, occupy permises in the city of Akron, O., and are two of the halfdozen largest and most successful concerns of the kind in the United States, each manufacturing a great variety of rubber goods, including automobile tires.

"The consideration to be paid by the Goodrich company is to consist of \$15,000,000 of the seven per cent, cumulative preferred stock and \$30,000,000 of the common stock of the B. F. Goodrich Company. For the purpose of enabling it to carry out the transaction the B. F. Goodrich Company will immediately call a meeting of its stockbolders for the purpose of authorizing an increase of its capital stock by the issuance of an additional \$15,000,000 of the preferred stock and an additional \$30,000,000 of common stock.

"When this increase of stock shall be effected, the captial of the B. F. Goodrich Company will consist of \$3-9, 000,000 of seven per cent. cumulative preferred stock and \$60,000,000 of common stock. Goldman, Sachs & Co., and Lehman Bros., of New York City, and Kleinwort Sons & Co., of London, bave agreed to purchase from the Diamond Rubber Company, which, together with the previous purchase of stock made at the time of the organization of the present-1t. F. Goodrich Company, will comprise about onehalf of the entire issue of the preferred stock of the later company and a considerable amount of the common stock as well.

"It is expected that in consequence of the acquisition of this interest by the banking houses named and the distribution of a portion of their stock among their clients a very much broader market for the securities of the B. P. Goodrich Company will exist in the future than has ever existed for the securities of either the old B. F. Goodrich Company or the Diamond Rubber Company. Stockholders of the Diamond Rubber Company upon the distribution of its assets will receive a considerable amount of cash in addition to their several shares in the stock of the B. F. Goodrich Company preferred and common.

"The Goodrich company will retain the executive staff of the Diamond Rubber Company in addition to its present

staff, and it is not expected that any radical change in organization or operating conditions will occur."

MINISTER FORMS TRUCK COMPANY.

The Cleburne Motor Car Manufacturing Company, which was organized recently in Cleburne, Tex., has as its president and leading spirit Rev. H. E. Luck, a local milister. He has been interested in the motor truck field for some time, and two years ago began the construction of a car along original ideas. The parts were made by Mr. Luck and the local machine shops, and the machine was named the Chaparrai.

Tested out for a year on the plains from whose principal vegetation the car received its name, it stood up so well that a company was formed to manufacture it. As originally designed the vehicle is expected to cover the average Texas country road and strike across country if in two sizes, one with a 20 horsepower motor, and the other in two sizes, one with a 20 horsepower motor, and the other with 25.50 horsepower. Both are shaft driven, the first with planetary transmission and the second with a three speed aliding gear unit with central control the central control.

The organization of the company is as follows: President, H. E. Luck; vice presidents, E. N. Brown and F. L. Deal; secretary, R. H. Crank; directors, J. E. Polndeste, Brown Douglas, G. A. McClung, S. B. Norwood, E. N. Brown, O. L. Bishop, R. E. Gatewood, J. M. Moore, A. C. Barber and F. L. Deal

STEEL COMPANY PRODUCES TRUCKS.

The Seamless Pressed Steel Commany, Redkey, Ind., which has been producing motor trucks in a small sey, is considering the possibility of removing to another city and has made a proposition to the Merchant's Association of Hartford City, Ind. A condition which the company makes is that the local business men take stock in the concern to the amount of \$25,000, in order that the necessary expansion may be carried out as planned.

CHASE ADDS NEW MODEL.

The Chase Motor Truck Company, Syracuse, N. Y., has added a new model to its already extensive line. This is a delivery wagon rated as 500 pounds capacity with open-ser body. It is equipped with a two-cylinder, two-cycle, air-cooled motor rated at 12 horsepower, the bore sail atroke being 4.125 and four inches, respectively. The design is the same as that of the three-cylinder motor used is the other Chase trucks. Ignition is by fixed spark, provided by a Bosch magneto.

UNIVERSAL MAY REMOVE.

It is stated that the Universal Notor Truck Compast, Detroit, is to move to Misvake, Wis, by July 1. At though nothing definite has been announced as yet. It is said that certain Misvakee interests which have considerable money invested in the Universal company have been working to secure the removal of the big plant for some time. The company employs about 2500 men and is capitalized at \$1,000,000.

NEW ORGANIZATION FOR SPLITDORF MAGNETO.

The formation of the Spilldorf Electrical Company with a capital of \$3.769,009, to take over the business hereicore conducted by C. F. Spilldorf, Inc., at Watton avenue and 13th street, New York City, is of direct literest to all branches of the automobile industry. It is understood that the reorganization of the company will mean no radical changes in the production of Spilldorf magnetos, spark pluss and coils, and other electrical devices which have been produced by the old concern for a large number of

The sponsor for the additional capital available is John F. Alvord, nresident of the Torrington Company, Torrington, Conn., which with its associated concerns has been engaged in the manufacture of automobile, motorycle and motor bost parts, accessories and appliances for some time. Mr. Alvord becomes president of the new company and Mr. Sultdorf, vice president.

The name of Splitfort has been associated with the production of electrical appliances for more than half a century. The Splitforf magneto has become particularly well known both in America and abroad, and in the face of most strensous competition has been able to take a place at the head of the list of current producers of this type. The added capital will enable the new concern to bring this product to the attention of the public still more advantage-oasily.

The stock of the Splitdorf Electrical Company is divided into \$1,500,00 of seven per cent, cumulative preferred and \$2,000,000 of common shares. The officers, other than president and vie- president, are: Treasurer, Bryant S. Keefer; secretary and general manager, C. W. Curtiss; directors, the officers and John H. Villes,

PEERLESS COMPANY EXPANDS.

Hecause of the recent growth of the company's business, the Peerless Motor Car Company, Cleveland, O., maker of Peerless pleasure and commercial cars, recently offered to its stockholders \$300,000 of additional capital stock, which was at once largely over-subscribed. It has also sold six per cent, bonds to the amount of \$1,100,000, these maturing in installments covering a period of 12 years.

It is understood that the sale of honds was for the purpose of providing funds for developing and extending the business, particularly in the motor truck department, which has been so successful as to warrant considerable expansion, The additional capital stock provided money with which to take up the company's floating indebtedness.

MEETING OF TRUCK MAKERS.

The second meeting of the Commercial Motor Vehicle Manufacturers will be held June 4 at the headquarters of the National Association of Automobile Manufacturers, New York City. At the meeting in March, the first of the new organization, 50 men were present, and a large majority of the truck makers of the country was represented. It has not ticipated that the attendance in June will be even more marked.

The programme which has been given out tentatively is as follows: Standarditation of frame withis and lengths, heights of frames and platforms from the ground, proportion of useful load to chassis weight, and tire sizes. Steps also will be taken to severe a census of production. Insurance rates for fire, liability, collision and property damage, and the proposed truck registration bill will receive their share of attention. The freedom of discussion which marked the first meeting is to be fostered, and the institution arges re-

presentatives to come prepared to participate in the discussion with all the information at their command.

TO MAKE ALTER VEHICLES.

The Cincinnati Motors Manufacturina Company, Citechand, O., which was recently chartered, has perfected its organization with the election of officers as follows: President, Franklin Alter; vice president and general manager.

H. T. Alter; treasurer, J. B. Doan, Franklin Alter is president of the American Tool Works Company, Cincinnati, and is also connected with a number of banks and other industries in the city. Mr. Doan is vice president of the American Tool Works Company, so that the new concern has a good substantial backing. A new plant of large size to be built this summer, and it is expected that the Alter car will play a large part in the motor truck field. At present, 25 machines are under course of construction.

DRUGGISTS TO INVESTIGATE TRUCKS.

An indication that the National Wholeasie Drug Association is taking an active interest in the use of motor trucks is to be seen in the recent action of the secretary of that association, J. E. Toms. He requested that members keep accurate statistics of their costs in using horses and trucks, and place the figures at the disposal of the chairman of the committee on transportation, Charles W. Whittlesey. It is expected that Mr. Whittlesey. It is expected that Mr. Whittlesey will present a report on industrial transports at the annual meeting next October, contrasting the efficiency of motor and horse transportation. The figures which the secretary has requested cover the following items: Capacity of trucks and horse-power, average daily rung, seculton a mile, oil a mile, average load, type of tire, tire expense, and comparison of total horse delivery account with motor excense.

HATFIELD TO INCREASE OUTPUT.

The Hatfield Auto Truck Company, which has been manufacturing four trucks aday in Elimia, N. Y., is reported as looking for a new location in order that it may have facilities for materially increasing its output. It may have stood that plans are under way for augmenting the available capital, as well.

WARE CARS FOR MINNEAPOLIS.

The Ware Vehicle Company, formerly located in Betroit, where a four-wheel drive motor truck was made, has curred a temporary assembling plant at 771 Raymond arenue, Minneapolis, Minn, and is conducting nexotiations with H. J. Tremain of the Minneapolis Commercial Club for the erection of a plant in the twin cities.

NEW OAKLAND COMMERCIAL CAR.

The Oakland Motor Car Company, Pontlac, Mich., maker of Oakland pleasure cars, is to enter the truck field with a 1500-pound, 40 horsepower delivery wazon, which it has just placed on the market. The car has a wheelbase of 123 inches, and has been thoroughly tested out in hard service. Four of the machines have been in daily use for some time at the Oakland plant, practically all the material which is purchased in Detroit being carried on these cars. The distance from betroit to Pontlac is 28 miles, and this has been covered daily by the trucks, the results being such as to instift further manufacture.

CONTEST BOARD REVISES TRUCK RULES.

The rules governing motor truck demonstrations which the Manufacturers Contest Association formulated a year ago and which were adopted by the American Automobile Association, bave just been revised, according to an announcement by the Contest Board of the latter organization, The changes are not drastic except in one or two instances. In the classification of the trucks a general revision has been made, division 1K now including vehicles of up to 1000 pounds capacity instead of 500 pounds, as before, with the other divisions raised accordingly. The highest section. 12K, now includes machines carrying from 16,001 to 20,000 pounds. The speed regulations have been considerably aitered, one of the conspicuous changes being that instead of specifying that the speeds must be adhered to, they are "recommended to the consideration of promoters." The table ls as follows:

			an Honr-	gester
Division	t-K		12	1.0
Division	2-K		12	1.0
Invision	3-K		12	7.0
Division	4-K		10	59
Invision	5-K	. 13	149	59
Phylsion	6-K	12	16	50
Division	7-K	. 11	10	59
invision	8-K	. 10	10	59
Division	9-K	9	9	
invision	10-K	. 4		8
Division	11-K	6	6	€
Division	t2-K	. 3	3	â

Grade 3 has been climinated, and there are now but two grades of contest. To take the place of the class which was grades of contest. To take the place of the class which was drouped, the new rules provide that a record of fuel consumption may be kept if desired and the fuel efficiency figures used in determining the standing of the cars. Three repairs may be made without penalty provided the work is done in six hours, after which time the penalty will be for latences at controls. A new rule has been added stating that the slower vehicles must give way to the lighter, faster ones on the road.

AUTO PARTS PLANT DOUBLED

The plant of the Sandusky Auto Parts & Motor Truck Company, Sandusky, O., is practically to be doubled by the building of a new addition and the installation of new machinery. This move is made necessary by the securing of a contract for 2300 motors, to be delivered during the coming year. Plans have been prepared for the new building, while is to be in full operation by next November, and will afford employment for at clean 230 men.

BUCKLEN COMPANY GETS FACTORY.

The Bucklen Auto-Truck Company, Elkhart, ind., has purchased the factory of the Elkhart Wrench Company, in which it will produce Bucklen vehicles in the near future. New and Improved machinery is being installed for this purpose.

FARMERS STUDY TRACTORS.

A course of instruction in the construction and operation of automobile farm tractors has been added to the curriculum of the Minnesota State Agricultural College, under the direction of J. I. Mowry, of the chair of engineering. The course is four weeks long; 40 farmers have been encolled. The mornings are spent in the classroom studying the theory of the practical work which is done in the afternoon, in the shows and on the fields. The

shop work includes pipe fitting, valve setting, farm blackamithing, and experiments with electricity, fuels and oils, while on the field the men get some experience in running gasoline and steam tractors.

AUBURN DELIVERY WAGON.

The Auburn Automobile Company, Auburn, Ind., is to place a new two-cylinder light delivery car on the market. The first cars are under course of construction, and are equipped with a 24 horsepower motor. The carrying capacity is 150e nounds.

LAMBERT-MORIN ELECTRICS.

The Lambert-Morin Motor Vehicle Company, Lawrence, Masse, after having conducted experiments for the past three years with electric trucks, is now manufacturing machines of its own design for the market. The thorough trial to which the design was subjected insures that the new rehicle possesses strength and reliability for the service for which it is intended.

ARGO TO TRIPLE OUTPUT.

The Argo Electric Vehicle Company, Saginaw, Mich., is building a four-story addition to its factory, which when completed, will enable the company to triple its output of electric trucks. The new structure will be 150 by 150 feet, and is to be ready for occupancy by July 15.

MORE ROOM FOR SAURER.

The International Motor Company, manufacturer in this country of the Saurer truck, which originated abroad, is building extensive additions to its plant in Planinfeld, N. J. The main shop, erecting shop, and the store house which each be enlarged. The capacity of the plant will be doubled, and it is anticipated that all of the room will be needed in keeping up with the large demand for Saurers which has been created in this condition.

WARNER ENLARGING PLANT.

The T. W. Warner Company, Muncle, Ind., is making extensive additions to its plant, in contemplation of enlarging considerably its line of truck transmissions, steering gears and control levers. The new buildings are of brick and steel contraction.

SPAULDING TO MAKE TRUCKS.

The Spaulding Manufacturing Company, Grinnell, in., a large and well established manufacturer of carriages, la to eater the motor truck field with the manufacture of light delivery cars. The concern has bad this in mind for some time, and has produced several experimental machines which have been so successful as to warrant placing the construction on the market.

RED SHIELD HUSTLER SOLD.

The Red Shield Hustler Power Car Company, maker or the Red Shield Hustler, a moderately priced light delivery car, has been bought by the Auburn Motor Chassis Company, Auburn, Ind. The new owner has not as yet announced any plans, but it is probable that the manufacture of the car will be transferred from Detroit to Auburn.

EFFICIENCY IN HANDLING COAL BUSINESS.

Longest Patented Unit Compartment Side--Dumping Body Solves Problem of Delivering Small Loads Economically--Provision Also for Quick Loading.

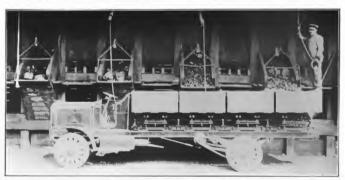
As THE subject of transportation is being given the vareful study that its importance deserves, it is becoming
more and more evident that the question of economy hinges
largely upon the matter of efficiency. The business world
may not be ready to concede to the motor truck industry
the credit for bringing these factors to its attention, but
it hardly will be dealed that previous to the advent of the
practical industrial transport little thought was given to
the cost of this end of the business. Horses always had
been used, and since there appeared to be no other alternative, those responsible for the delivery stem paid little
attention to details, beyond seeing that the goods were
delivered as near as possible to the time promised.

The commercial car salesman who first brouched the

ls a growing tendency to specialize in types particularly suited for certain lines.

Considerable attention has been paid to the matter of dumping bodies, designed to meet the requirements of coal, sand and gravel desiers, contractors and others. The subject contains much of interest, and it is one which cannot be dismissed without ample study. The needs are externely varied. A body which will meet every demand of the large dealer may not be at all suited to the delivery system of others. This applies more particularly to the question of carrying capacity.

Practically all dealers are called upon to carry large loads, at least at times. While economy may be possible with small wagons, the question of efficiency enters into the



Longest Four-Ton Truck Fitted with Patented Unit Compartment Side-Dumping Body Receiving its Lond of Various Kinds of Coal.

subject of ton-mile cost found he was talking in terms that were little understood. However, all this has been changed, and today the business man is convinced that motor trecks can do work much more economically than horse drawn equipment. Still, this is not all there is to the problem. Because one firm is sale to utilize a certain sized vehicle to advantage is not necessarily any reason that other concerns engaged in the same line will meet with the same superlence.

The result has been a careful study of the problem on both aides. The thoughful saleman who considers the future of the Industry does not advocate the purchase of vehicles which he has reason to believe are not adaptable for the work at which they are to be put. In most instances, it undoubtedly will be found that the body equipment is quite as important as that of the chassis. Many manufacturers are realizing this situation, and while it obviously is impossible for any maker of motor trucks to cater to every need in the matter of body design, without reserving at liberal capital allowance for this purpose, there consideration, and it is not to be assumed that the greatest economy will be present without the maximum efficiency. If a majority of the business calls for small loads, the problem offers one phase, but if the opposite be true, there arises the question as to carrying small loads in a wagon designed for large ones.

Suppose, for example, that a coal merchant were called upon to deliver four one-ton loads to a certain locality. If he were supplied with one-ton wagons only, this would mean four trips, with approximately half of the time being taken up with what is termed dead mileage. If he were equipped with but one four-ton truck, the situation would be the same, unless some method were devised whereby the four loads could be carried separately and at the same time. There would be this difference, however, in that the cost of maintenance on the larger truck would be greater a whelle than on the smaller.

To overcome exactly this situation, the Longest Bros. Company, Louisville, Ky., maker of Longest trucks, has produced the unit compartment side dumping body shown



Rear Compariment Depositing Its Load, Indicating Simplicity of Operating Mechanism,

herewith. This is a patented device, on which the patent was issued Jan. 2, 1912. With this type of body, the merchant referred to above could carry his four one-ton loads at the same time, cutting the cost of delivery very materially, reducing the total of dead mileage in a day, and having available at all times a vehicle capable of handling either large or small loads as occasion should demand.

Of course, this proposition applies in much the same manner to other lines. The building contractor, for instance, would find the Longest body distinctly valuable in carrying two, three, or four different kinds of loads at reasons time. The possibilities are many, and the design should find much to commend it.

There are other features of equal merit. It will be noted that the construction of the individual compartments is such that they may be dumped at either side. It may be assumed that the load of coal, for example, is to be delivered in a narrow alley. No turning or backing is necessary; no manosuvring to get into position. It is immaterial even, which end of the alley the truck enters. The load is dumped just where it is wanted and the driver is free to take the next order to its destination without delay.

Suppose, however, that the ailer is obstructed and the driver cannot get through. As the material is dumped clear of the path over which the wheels must travel, the driver may back out much more outckly and easily than would be possible with a team The same thing applies to dumping on the sidewalk. In fact, no situation can be cited in which the load cannot be dumped as desired, uniess, possibly, that in which the hole is located directly underneath the wagon. Even then, the Longest dumping body could be utilized as advantageously as any other type, except that especially designed for dumping through the bottom.

It may also be pointed out that the contents of the four compartments may be dumped in one place just as easily, and quite as readily. The only manoeuvring necessary would be that of driv-

Ing the truck forward slightly as each load was dumped and even this may be dispensed with if desired. The very simplicity of the arrangement makes this condition possible, and has an added advantage.

From examination of the accompanying illustrations, it will be seen that each compartment is hinged upon a certral rod which is accurely braced to the frame. At either side is a pivotally mounted support, a rod extending from the central hinged portion to the centre of this support. This latter rod has a threaded end which passes through the support and carries a nur.

The method of operation is as follows: The not is screwed back until it releases a clamp which holds the side support in position. This support is hinzed, one edd folding up against the bottom of the compartment, while the other normally rests in sockets on the frame. As the clamp is released the hinzed portion is folded easily, and the upper end is held in place by a catch on the bottom of the container.

After this has been done, all that is necessary is to drop the chute door on this side of the dumper, which as will be noted, is of metal securely riveted. When it is



Depicting Method Employed in Dumping One of the Computments to the Left, and Showing Inside Construction of the Unit.

in a normal position the floor of the compartment slopes from either side toward the centre, but as a catch is released on the opposite side, the support having been removed, the weight of the load reads to tip the compartment and the entire contents are emuted automatically.

The explanation takes decidedly more time in the telling than is required for actually accomplishing the work. As assumed as the constraint of the constraint of the constraint of the and it is only necessary to restore the supports to the original position, serves up the locking nut, and the sruck is ready for the next deliver.

It is maintained by the maker that the use of this dumplined by does not necessarily imply that a skilled workman must be employed. There is nothing about the construction that is intricate or not easily understood. It is a plain, simple plece of mechanism, with all pairs substantially built, and not liable to breakage, even with extremely rough isandline.

The Longest Bros. Company has given the matter of quick loading quite as much attention as that of quick unloading. One of its plans is presented is an accompanying sketch. The arrangement provides for lifting off the empty bins or compartments and replacing with filled ones. This

demountable feature can be employed to advantage in many instances, and its practed utility is obvious. It enables the truck to be kept in constant service, save for the very few minunes with other are required far exchanging the bodies, and the workmen in the yard or at the coal pockets may be kept busy all of the time in flips bodies. Another advantage is 10 be noted in the case with which the exact weight of each load may be determined.

The sketch is self-explanatory. A represents the rullroad can coal pocket. B shows the temporary structure which has been erected to accommodate the compartment. D as it is being filled. C is the truck, upon which a special frame has been installed to take the compartments. E depicts the method of removing the empty

body, and F the chain falls so arranged as to travel on an overhead runway. This is suggestive merely, and any similar method might be employed as occasion demanded.

It ought to be said that these parented compartments were designed perimarily for use with the Longest truck chassis, made by this concern. The company produces everything that goes into these vehicles, as well as into the dumping units. All parts are made to jig and templet and are interchangeable. The chassis are designed and constructed with a view to work to which they are to be but.

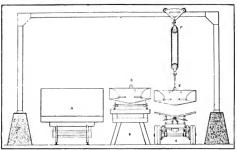
However, it is possible to secure the Longest dumping compartment for use on other vehicles if desired. In fact, the ceneern has made a careful study of haulage problems and is prepared to offer a solution tu meet any condition. It realizes thoroughly that differing requirements make necessary varying methods of loading and naloading, and is glad of an opportunity to suggest its plan for handling them.

The A. O. Smith Company, Milwaukee, Wis., has established a general sales office for the Smith Milwaukee truck at 2328 Michigan avenue, Chicago.

LARGE FIELD FOR LIGHTER VEHICLES.

It is stated that there are now \$12,400 light horse drawn whelees in four of the eastern naires alone, used for delive-wheelers for our of the eastern naires alone, used for delive-ering the less bulky and heavy merchandlee. As the lighth motor delivery wagon can do the work of these wagons to greater advantage and with superior economy, It is expected that they will superable the horses to a great extent. What is true of these eastern saires is true of all the other states of the country, so that bundreds and thousands of states of the country, as the merchania swakes, 10 their economy and advantages.

In sime the motor delivery will be an essential a part of the equipment of a store as is the cash register and the telephone. Department stores are using the light waxon with great success, John Wannanker operating a number of 1000-pound cars for city delivery of smaller parcels in conjunction with his large trucks. It is in conjunction with the latter that the smaller machines are being used to a great extent by large firms which a few pears ago desired heavy duty vehicles or none. They are finding that it costs more to deliver a two-pound parcel by a two-ton truck than



Suggested Method of Quick Loading with the Lac of Longest Patented Hody,

It does by a 750-pound wagon, and consequently are using the latter. Loads are taken from the store by the large trucks and distributed among the small machines at various depois in different parts of the city

Charles F. Redden, manager of the New York Studeblaker branch, has estimated that in the next two or hirew years there will be \$200,000,000 invested in light delivery wagens. This seems a large sum, but at \$500 each, only \$250,000 wagens could be purchased, which would take care of only a little over half of the number of horse wagens in four of the eastern states. Purchases of light delivery wagens are bound to libercase in number as the merchant realizes that he is paying from \$5 to 30 per cent. more to haul his goods by horse than is necessary.

DURANT-DORT HAS NEW MODEL.

The Durant-Dort Carriage Company, Flint, Mich., maker of the liest wagon of 500 pounds capacity, is bringing out a new 1.5-ton model. This will be provided with a four-cylinder motor, and it is expected will embody some-entirely new features.

THE A B C OF MOTOR TRUCK OPERATION.

A Simple Exposition of the Principles Underlying Operation, Maintenance and Repair of All

Motor Driven Commercial Cars, Describing Details of Their Components.

Part XIX—Explaining the Function of the Differential.

By C. P. Shartuck.

HAVING outlined the methods utilized for transmitting the energy of the motor to the driving or road wivels, as well as the function of the clutch and transmission, the next logical step is the mechanism by which the power is properly distributed between the driving wheels when the machine is turning; corners and describing other curves. This is called the differential atthough it is also known as the balance, compensating or equaliting, egg, and is perhaps, the least understood by the novice to whom it is more or less of a mayerry. Few operators understand its principles.

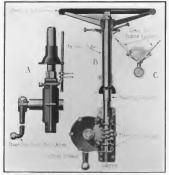


Fig. 86.—Components of Steering Grar: A, Lower End of Steering Column and Worm Wheel Rousing: B, Outlining Principle of Worm and Worm Wheel; C, Levers Controlling Carburetor and Jensites.

ciples or can explain why one wheel rotated in a forward direction imparts an opposite movement to the other member when both wheels are not in contact with the ground.

If two wheels of equal size were loosely mounted on a solid shaft as in carriage construction, and moved in a perfectly straight direction, both wheels would rotate at the same speed. If a curve be encountered the outside wheel having a greater distance to travel will rotate faster than the inner member. This will be readily noted by an examination of the tracks of a car on a curve, as at a corner. If the wheels be keyed or rigidily attached to the solid shaft and revolve only when the latter rotates, the linner wheel upon turning a corner would of a necessity he compelled to silde on the ground, and this, of course, would tend to twist the axie shaft as well as subject the wheel to severe stresses.

Theory of "Fifth Wheel,"

In a horse drawn equipment the tractive power, the horse, is applied at the front and is separate from the carringe itself. Each road wheel is loosely mounted on a solid shaft and the rear members are rigidly fastened to solid shaft. Not solid shaft and the rear members are rigidly fastened to the body. The from taxle instead of belink bolted to the rest of the frame is secured to a device known as the "fifth wheel" or circle, this comprising two movable horizontal members, one of which is connected to a part of the body and the other to the axle. These circular members are pitotally bolted at the centre, the arrangement permitting the vehicle to tura corners and describe other curves. Were it practicable to apply the motive power to forward wheels mounted in this manner, this plan of construction could be utilized for mechanically propelled road vehicles.

With certain exceptions, however, the power of the moor ar is applied to the rear wheels either by chains or shafts, as previously explained, and the movement of the car directed through a steering mechanism actuating the front wheels which are pivotally mounted.

Function of Balance Gears,

Floneers in the automobile industry adopted balance goars, incorporating them between the divided rear sale. These were of the bevel or mitre type, a design utilized with ateam food wagons as early as 1843. These permitted the application of power to the rear axie so that the energy could be distributed properly to both traction members when the vehicle was moving in a straight line as well as when turning corners or describing curves. The device consisted of a bevel gear wheel rigidly attached on either side to the inner ends of the divided axie, one serving to turn the right hand wheel and the other the left, Between these gears were fitted small bevel pinions rotatably mounted upon bearings or studies attached to a casing or housing, secured to the periphery of which was the sprocket or spur gear. This same principle is employed today.

These plaines are in mesh with the gears attached to the ends of the axless and it is obvious that if the right hand gear be rotated in a forward direction the plaines will inpart an opposite movement to the other larger gear, causing it to revolve backward; that is, when both wheels are not in contact with the ground and the driving plaine is not accusating the driven gear attached to the differential easing.

Operation of Differential.

When power is applied easing the vehicle to move forward, intend of rotating, these phinons remain motionless, acting as a lock or clutch and securing uniform and continuous rotation of both traction wheels. When a movement to turn the vshicle is made, causing the wheels to move at different speeds, these phinons begin to rotate on their own axes, permitting the pitron sheet to slow up or remain, satisforary, as conditions may require, rest at the same time continue to urge forward the other at indicated sheed.

It is obvious therefore that when the resistance offered by the two drive wheels and attached gear is the same as when the car is driven forward, the pinions cannor rosticand when the resistance is greater on one road wheel than on the other, they will rotate correspondingly, although still moving forward with the wheel offering the least resist-



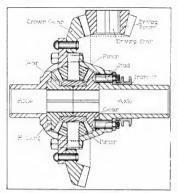


Fig. 81-Differential lieur of Three-Tan Truck with therice for Locking Axies as a Unit.

ance. The plaions may also revolve independently on one gear wheel, while still acting as a clutch on the other and earrying it forward. In other words, the small bevel pinions turn on their stude, allowing the necessary relative motion between the larger gears and at the annet time continually transmitting power to the two ends of the sale shaft in proportion to the demand.

Components of Differential.

A conventional type of differential with its components is outlined at Fig. 82, and 81. It will be noted that the differential casing is in two sections and that at A carries and interest on the crown gear. It will also be seen that the small bevel pinions are in mesh with a bevel sear to which is attached the end of the aile. Another sear is shown at B and this member meshes with the pinions in a similar manner when two possible to the two parts of the casing are secured together by means

of hoirs. It will be noted that the centre of each larker gear has a square opening into which the ends of the axies fit. A differential assembled is illustrated at C, also the roller bearings supporting the device in the differential housing.

The components of the equalizing year, axies and driving pinion are grouned at D to show their relation to each other. If the sunared ends of the axles were fitted into their respective recesses. in the beyel gears and energy imparted to the crown gear through the driving pinion, the sprockets on the outer ends of the countershaft would rotate at equal speed. The road wheels carrying the driven sprockets would revoive at the same ratio as the axies and the differential would revolve as a unit. If the machine describe a

curve, the outer wheel will rotate much faster than the inner member and the differential mechanism becomes operative, as previously explained.

Spur Differential.

In the spur differential the bever cears are replaced by those of the spur type, a large sear of this kind being attached to the ends of the arise A double set of spur pithons replaces the bevel members, in a bearing in the housing and rotating on axes parallel with the axie. For each bevel pithon there are two spur members which mesh with each other and one is in method with one of the larger gears. Although the construction is slightly different the same results are accomplished. A form of spur differential was shown at Fig. 3.

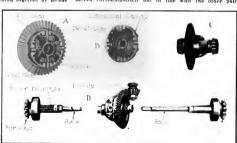
At Fig. 81 is depicted a differential utilized for a two threestor capacity truck and the intermal parts of this design are made from, 20 carbon sivel forgible, case hard-cared and reheated. The bearing surfaces are hardware, insuring proper lubrication. Differentials may be entirely with a tocking device as indicated, this being simple and with a tocking device as indicated, this heing simple for the control of the contro

Chain and Shaft Drive.

When the side chain drive is utilized the differential is incorporated with the jackshaft assembly, energy heing conveyed from sprokess through chains to the road wheels which rotate at the same speed as the sprockets on the countershaft when the vehicle is traveilling in a straight line. The ratio does not vary until a curve is encountered when the inner and outer road wheels revolve at different speeds because the driven sprockets on the countershaft are not rotating at the same speed because of the different speeds because the driven sprockets on the countershaft are not rotating at the same speed because of the different alled to the same speed speeds the same speed to the different tall when the same speeds the same speed to the same s

The Steering Gear.

In order to change the direction of motion of a fourwheeled vehicle, either the front or rear wheels must be moved correspondingly out of line with the other pair.



15. X2—Construction and Application of Differential Genry A, Showing Pinions in Mesh with fivel Genry B, Coning Removed in Depict Revol Genry C, Differential Assembled B, Onlining Axirs, Sprockets, Diving Pinion and Differential and Their Reinton as Each Others.

With the horse drawn equipment this is accomplished by the fifth wheel, but this arrangement is not adaptable to the mechanical transport owing to the room it would oc-

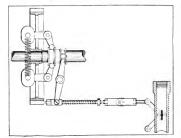


Fig. 83—Governing Device Automatically Controlling Speed of Vehicle,

cupy and the severe shocks which would be set up to the steering mechanism. Instead a fixed axie is employed with the wheels carried by rotating pivoted axie stubs, which permit of the deflection of each wheel through a relativeby wide angle.

At Fig. 84, A and B, is depicted a conventional type of 1 beam section asize utilized for heavy commercial vehicles and it will be noted that the spring pads are integral, these being shown at A. The spindle is secured to the forked end of the solid member by a bolt extending through it which moves freely in a horizontal plane, permitting the road wheels to be deflected into any desired angle. Integral with or secured to each member is an arm, the free ends of which are connected by a theory of the near actuated by the steering connection, moves each wheel simultaneously. It also serves to align the wheels with the rear members and provision is made for increasing or decreasing the length of the road to bring about this result.

The spindles are substantially constructed and may be fitted with piain, roller or hall bearings to provide for easy movement as it is important that all components of the steering mechanism operate easily. Roller or hall bearings are employed in the wheels, the hubs of which retain the spokes. The springs are secured to the axle by spring clips and generally are constructed in semior full elliptic form. These members are of a high grade steel, carefully tempered. Their width, thickness and number of leaves depend upon the carrying capacity of the vehicle. When semi-elliptic springs are fitted, one end is secured to an extension of the frame while the other extremity is attached to a shackle which in turn is firmly anchored to the

frame. Grease cups are fitted to the spring bolts to reduce friction and prevent wear.

Having provided the car with movable front wheels and

a differential for describing curves, it is essential that means be incorporated for directing the movement of the machine without undue exertion upon the part of the operator. It is also necessary that any defictions of the road wheels through encountering obstructions shall not react upon the hand wheel and cemmunicate shocks to the driver's hands. The commercial vehicle is operated over couble stones, rutty roads, etc., and it is important that components of the steering system be well designed as well as constructed of high grade material.

To prevent the wheels from turning when soft dirt or ruts are encountered the operating mechanism is of the irreversible type. Its principle may be compared to a thread rotated within a nut which is prevented from turning, but capable of sliding. The serve will move the sut easily, but ordinary force applied to push the nut will set turn the serve.

At Fig. 80 B is depicted a conventional type of steering gear adaptable for a heavy truck. It will be noted that the steering column carries a worm which is in mesh with a worm wheel to which is attached an arm having a ball member. The column is free to rotate in either direction. but end motion is prevented by the two ball thrust bearings. When the hand wheel secured to the column is retated, the worm revolves, imparting motion to the worm wheel which moves the arm backward or forward. The latter is connected with the operating mechanism of the front wheels by a rod. By moving the hand wheel to the right or left the road wheels are deflected in a corresponding direction. The number of turns required of the hand wbeel depends to a certain extent upon the pitch of the worm. If this be rather fine several revolutions will be necessary to bring about the desired result.

The worm members are enclosed in a dust and oil proof housing which is secured to the frame of the vehicle. The steering column revolves freely within a tube which is fastened either to the dash or floor of the ear. These members may be inclined or in an upright position, depending upon the design of the automobile and to permit of easy steering the hand wheel is of liberal size.

The levers controlling the mixture and spark may be mounted on the top of the steering wheel and rotate with 1º or located heneath, as shown at B. These levers are depicted at C, one being utilized to actuate the ignition de-

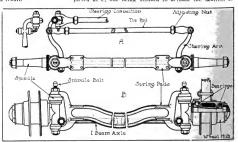


Fig. 84-1 Beam Section Front Axie; A, Top View, Depicting Control of Road Wheelst B, Constenction of Wheels and Method of Support.

vices, and the other the throttle of the carburetor. The method of establishing communication between the wheel and these members is shown at A. On movable tubes or rods are attached two arms to which are secured the rods from the magneto, timer and carburetor. Ball and socket joints or other suitable pivotal devices are employed to facilitate operation.

Liovernors

To regulate the speed of the automobile a governor is fitted. This device prevents the operator from exceeding a predetermined rate, as by it the amount of mixture suppiled to the cylinders is automatically regulated. The most common form is the centrifugal type, consisting of a pair of weights carried upon and set into rotation by the engine shaft. These weights are drawn together toward the axis of their shaft by means of a spring, so that when the motor is stopped they are close together.

When the revolutions of the engine increase these weights are rotated rapidly and entifugal force tends to force them apart and against the tension of the spring. A decrease of speed allows them to move together. Attached to the arms of the weights is a collar which moves freely upon the shaft. This collar actuates a rod which opens or closes a value in the intake manifold or operates the throttle of the carburetor. A type of centrifugal governor is depicted at Fig. 8.3. Various designs are utilized upon the commercial vehicle and so constructed that they may be sealed to prevent the operator from increasing the speed of the car beyond a rate determined by the owner or manufacturer.

MACHINE FOR FITCHBURG.

Fitchburg, Mass, is to have snother minicipal automobile, which will be the seventh to be purchased by the city. It will be of the semi-convertible type, the rear seats being removable for the substitution of a box body for tools, etc. The car will be used by the sewer department, and the body is now being built. It is a slightly used 1912 Buick, and it is expected, according to the flaures of A. M. Jackson, the assistant super-intendent, who will be the principal user of the machine, to prove cheaper than the horse and carriage which has been employed heretofore.

MAINE VEHICLE CARRIES ACID.

A somewhat perflous trip was made recently by a truck in Maine. Loaded with acid, a 3.5-ton machine went from Portland to Whites Bridge, Sebago Lake and return in 3.05;00. The total distance was 40 miles, and the time was excellent, for the roads were poor and necessitated considerable lessening of speed and great ear, on account of the fragile carboys which constituted the load. The acid went through without any of It even heing spilled.

ALTOONA TO BUY FIRE WAGON.

It is stated that after having had three different makes of motor trucks demonstrated in four different cities for their benefit, the authorities of Altoons, Penn., are about ready to purchase a motor truck for the fire department which will take the place of some of the horse drives apparatus. The fire committee is to hold a meeting some time in the near future to consider the matter,

The members of the committee visited Johnstown, Penn, which is a hilly city, and Inspected the work of the American-LaPrance machines which are used there with great success. They then visited Columbus, O., where the Seagrave car is in operation, and were much pleased with the performance of the air-cooled truck in speed and hill climbing tests. They also went to Pittsburg and Wilkinsburg to

see the operation of the Knox machines in those places, and again a good demonstration was given.

The committee being satisfied of the advantages and practicability of the motor truck for fire apparatus, has now only to decide which machine it will select. Hids have been onened, and a contract will be awarded in a short time.

PROVIDENCE WANTS TRUCKS

The board of aldermen of the city of Providence, R. 1., has adopted a resolution urging the subatiution of automobiles for horses now used in the various city departments, and the establishment of a municipal garage with complete repairing facilities. The resolution directs the committee on ordinances to inquire into and report as to the advisability of this move, but there is no doubt that the report will be favorable, judging from the present enthusiasm.

The aldermen, before passing the resolution, secured statistics on the costs and advantages of motors for municipal service, and believe that a very large saving would accrue to the city in the course of a year by the use of trucks, and that they would pay for themselves in a short time.

The plan is to select some standard machine and equipuls the various departments with sufficient cars to provide for all emergencies. A comparative table which the men worked all emergencies. A comparative table which the men worked cost of a horse at \$30 a month, covering a distance of 500 month to operate, a cost of about the cent a mile for the au-month of provided at \$1.30 a month to operate, a cost of about the cent a mile for the au-month is flagured, together with the knowledge that horses become sick while machines so do not, and that he life of a horse is more delicitate than that of the motor, convinced the aldermen of the desirability of the trucks.

That they appreciate that to realize the full advantage of a motor installation the machines must be taken care of by experienced men provided with complete facilities is shown in the recommendation for a municipal garage with full equipment. At present the public works, school and park departments of the city are provided with machines, which have proved satisfactory. The final conclusion of the board was that automobile equipment would quadruple the efficiency of the city departments at one-half the expense.

The board of police commissioners has also gone on record as advecating motors, having receitly applied for an appropriation of \$8000 for the purchase of two motor patrol wagons to replace the present horse vehicles. This has been referred to the committee on finance, and will probably be granted.

BOSTON SEEKS MORE TIME.

Boston motorists and operators of motor trucks have been waging a campaign lately to be allowed to stand their cars in the streets for a longer time. The regulations in regard to the time cars are allowed to stand at the curb are variable, at the discretion of the local policeman, and consequently matters are quite unsatisfactory for the majority, who do not know just bow long they are allowed. The Electric Vehicle Club has suggested that there be a definite time limit for various districts, and that it would be much more satisfactory than a discretionary limit even if the latter were longer. It has suggested a limit of 40 or 60 minutes for the greater part of the city, which would be ample to allow of the usual loading and unloading operation with a motor truck. The street commission is to take the matter up, and doubtiess will give all interested in the proposition opportunity to be heard.

FEATURES OF MORGAN FIVE-TON TRUCK.

R ELIABILITY, durability and economy are important factors in the transportation problem and these receive serious consideration by the conservative business man contemplating the replacement of his horse drawn continuent



Exhaust Side of Morgan Mojor I tillard to Pive-Ton Truck.

with the mechanical transport, Uninterrupted service enters into the question of economy and for a truck to be operated at its maximum efficiency the entire mechanism must be simplified to a minimum so that the most inexperienced driver can understand it. Every working part must be immediately accessible for inspection, adjustment and rebisences.

The Morgan trucks, manufactured by the Morgan Motor Truck Company, Worester, Janss, were designed by Rajby, L. Morgan, one of the ploneers in the automobile industry. His engineering experience extends over a period of years and be has made a careful study of the transportation problem both abroad and in this country incorporating links models the best engineering practice. These automobiles were tried out under the severest renditions and after seven years of careful experimentation the present Morgan truck was placed upon the market.

It was originally designed upon three basic principles, strength, simplicity and accessibility, and during each stage of its development up to the present high efficiency stage of the development up to the present high efficiency distribution of the property of the prop

Distribution of Load.

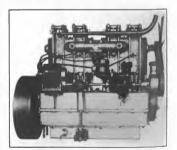
A noteworthy feature of the design is the proper disrition of the load, this being brought about by the utilization of the space usually occupied by the motor in front type for the driver's cab. From the front of the radiator to the rear cross frame member all space serves a useful purpose, permitting of a 143-inch wheelbase without undue extensions in front of the dash. The advantage of such an arrangement is obvious when operating in traffic or turning the machine in narrow susces. The fact that but 65 per cent, of the load is carried on the rear wheels makes

The driver is located at the right with the motor in the centre of the cab and all the components of the latter are control of the cab and all the components of the latter are not only aversalible, but are designed strictly for truck service. A vertical four-cytinder, four-cycle, water-cooled units is employed, having a five-inch bore and five-inch stroked, having a five-inch stroked having and with S. A. E. rating of the horsepower, although it will develop considerably in excess of this. The cylinders are cast en blor, a special high grade, close grained gray iron and rings, insuring perfect compression and a revent beland and rings, insuring perfect compression and an eventy beland and these extending from the base of the water lackets which are also cast Integral, making for compactness as well as stability.

Removable Cylinder Heads.

One of the features emphasized of the Morgan product is the simplicity and accessibility of the valves and their operating mechanism. Both the intake and exhaust members are located in a removable cylinder head, are of amile site, and contactured of hish grade material. By loosenia for muts these heads may be withdrawn for inspection or for gridning the valves. The latter are of the rocket type and the actuating mechanism is not only simple but of liberal proportions, which with provision for proper laberication not only insures correct valve timing, but long life of the working parts. The valves are on the right had side of motor and are mechanically operated, their lifts being of large size and moving in substantial guides. High grade material and workmanship have created a quiet running moves plant.

The intake manifold is integral with the cylinders and is mixture which is supplied by a float feed carburctor on the right hand side of the motor. The vaporizer is of special construction, being designed for the Morgan motor and it is claimed that it is adjusted easily and when once set reouters no alteration or attention whatsoever.



Simplicity and Accessibility Are Feniness of the Morgan Motor Located in the Cab Beside Driver.

The exhaust manifold embodies the same excellent features as the Intake, being integral with the cylinders. Each end is fitted with removable plugs through which any carhon may be removed easily. The exhaust pipe is size of liberal size and back pressure is reduced to a minimum. The left hand side of the motor is remarkably free as the be noted in an accompanying illustration. The crafts and cambaft are of high grade material, carefully ground size and operate in liberal bearings. The gears are of high grade steel, accuracily cal.

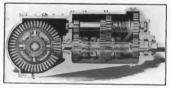
Ample Cooling Surfaces,

In the matter of cooling, the Morgan motor is note-worthy in design, as not only is provision made for maintaining the proper temperature under all conditions, but for cleaning as well. The exhaust side is fitted with a detachable plate as its the intake sled, and an opening in the latter allows water from the pump to be forced through the large water facets, around the valves and thence through a well designed manifold to the radiator. A large sized centrifuxal pump, gear driver, takes the cooled water from the radiator which is of high grade cellular type and of amule size.

Dual leuition

Two separate and distinct Ignilion systems are utilized, such having list own pilos. A four-util vibrating coil, timer and battery furnish the ignilion for the plugs on the left of the motor while a high-tension magneto supplie current to the pilos on the right. Either system may be operated independently of each other. The coil is located on the right of the dash in a recess and is accessible as well as being protected from possible injury.

Considerable attention has been paid to detail in the Morgan power plant. The pump is equipped with a percock



The Transmission is of the Cansiani Mesk Gent Type Providing Easy Changes of Speeds Williami Clashing of Gencs.

by means of which the entire water system may be drained while compression cooks are fitted to the detachable cylinder while compression cooks are fitted to the detachable cylinder heads, and grease enus to the hearings of the shafting deriving the numma of magneto. An adjustable, ball bearing, and fitting high and driving high and the second driving pulley is actuated by the same gear as that operating the pump and magneto. These scars are easily accessible by the removal of a housing.

Dual Lubrication System.

The efficiency of an internal combustion motor depends largely upon its lubrication and special attention has been given to this important subject. Two separate and distinct olling systems are employed. A gear driven pump forces oil through an aperture in the crankshaft to each hearing and to all connecting rod bearings. This lubricant is constantly circulated. Interposed between the crankcase and oil reservoir is a pressed steel pan carrying the lubricant utilized for the splash system. It will be noted that the crankcase is constructed in three sections and being accurately machined is oil tight. The nump is attached to the lower member and is actuated by a spiral spring, relieving it from all possible shocks and making for accessibility. The lower crankcase is equipped with two petcocks for noting the supply of jubricant and for draining the tto blo

The Morgan ciutch is of the multiple disc type with al-



Depteting Accessibility of Components of Driving Ends of Jackshaft, Including Rubber Cushinutag Blocks,

iernate plates of steel and copper, these operating in a bath of oil. A feature of the device is a leather universal attachment inserted between the flywheel of the motor and clutch. This disc being of very flexible leather relieves the clutch of all shocks.

The Morgan transmission is of the selective type providing three speeds forward and reverse and the change speed gears are always in mesh, preventing the stripping of teeth as well as obtaining at all times the benefit of the fuil strength of the working faces of the gears. Clashing of gears is impossible as the transmission has a set of jaw clutches or dogs on the face of each of the speed change gears which are loosely journaled on the driven shaft, and two corresponding double sliding clutches mounted on squared portions of the driven shaft, by which any one of the speed change members may be locked to the shaft. Each set of clutches has an aggregate parallel working face of 2.5 square inches to withstand all stresses in making changes of speeds, which may be accomplished easily regardless of the rate at which they are rotating. It will be noted that the transmission is of the hulit-up type, the driving shaft being below, making for compactness and accessibility.

As with the motor construction all parts are made to unicrometer measurements, making any rephacement a simple matter. The components of the transmission are strong, durable and properly proportioned and the spears are of the very best grade of steel, accurately cut and finished. All the bearings are imported annular and thrusts bed little, except on the main shaft, first and account speed gears, which are roller of annuvered design.

The jackshaft and transmission are a unit and the former is mounted in a spherical housing, which in turn is supported by a substantial bracket secured to the manframe. This housing protects the Jackshaft when the machine is traversing uneven roads as it carries a spherical joint, the application of which is depicted in an accompanying illustration. The Jackshaft is of a success the last travel



Constructional Features of Morgan Trucks 5, Leather Uniternal Atlachment Heiween Flywheel and Clutch; B. Spherleal Join of Inchahati for theorhing Road Inequalities





Margan Chassis Fitted with Standard Type of Body, a Machine Which tins Heen in Service fiver Two Years,

chrome nickel steel and operates on a heavy imported aunular ball bearing mounted in the spherical housing.

Universal Joints.

An interesting feature is the Morgan universal couplings and joints illustrated herein. They consist of rubber blocks in sections carried in a housing and the design is such that when energy is applied these members absorb all shocks such as a too sudden application of the citatis, improper changing of speeds and intequalities of road. These shock absorbers are fitted to the jackshaft and one of the same design is utilized on the drive shaft. The advantage is obvious as the units of the chansies are relieved of sudden stresses brought about by improper application of power when the characteristic control of the characteristic characteristic control of the characteristic ch

Final drive is by double chain, 1.75-inch pitch and the sprockets are of the best material and the teeth are accurately cut. The rear axie is of the dead type, 3.6 inches in diameter, and is constructed from nickel steel bars of

round section finished on the ends to receive the radius rods, spring seats and bearings. The front axie is five-inch I beam section type of drop forged steel.

The springs are unusually strong and realitent, built expressly for truck work and are seemi-elliptic both front and rear on the three and five-ton models and semi-elliptic front and full elliptic on the two-ton car. Shackless are not utilized, the springs being supported by a wearing plate, simi-sir to that employed on heavy horse drawn vehicles. They are secured to the axies by U holis through large seats, making for simplicity as well as great strength and rightly. On the five and three-ton models an auxiliary semi-elliptic spring is fitted to a right cross member of the frame at the rear. Well designed torsion rods are employed, their design making II an easy matter to adjust the chains, as well as to insure perfect alikinment of the road wheels.

Solid Metal Wheels Employed,

Solid metal wheels of the locomotive type are employed and the rear members are mounted on liberal sized imported annular ball bearings with large, special double row ball thrust bearings, these taking all side stresses and leaving the annular members free to carry radial loads. This is an



Chassis of the Morgae Five-Ton Truck Which is Noticeable for Accessibility of Warking Paris and Simplicity of Operation.



Morgan Serew Discharge Rody, Showing Detachable Chute through Which Contents Are slips the key into place, and the Bischarged by Serew Conveyor Operated by Energy of Motor.

exclusive Morgan feature. Roller bearings are fitted to the front wheels which are equipped with single solid rubber tires, 36 by six inches, while the rear are dual, 36 by five.

Two sets of brakes of liberal friction surfaces are provided. The service members are two external contractions on jackshaft inside of frame and are operated by pedal. The energency members are of the internal expanding type on the rear wheels and are actuated by the usual hand lever. Both sets are lined with asbestos, sween on wire mest.

Although the frame in fiexible it is unusually strong. It is of rolled structural steel, ski-lach channel section with rivets hot driven. Two steel channels compose the side members, which are securely braced by substantial cross members and the latter are anchored by Instee guessel plates and corner braces. A feature of the construction is that rivets are not driven through the tension member of the frame. It is 17 feet eight inches long and 13 feet 10 linches back of the driver's seat.

The steering mechanism is of the irreversible type, constructed especially for heavy dust trucks and the steering column is equipped with a 22-inch wheel. The knuckies, arms and connections are of high grade undertail. The susk and throttle levers are on the steering post and the accelerator is operated by needs.

All working parts are protected from dust and dirt, a substantial and accessible shield being fitted under the power plant. The tread is 64 linches and wheelbase 143. The fuel tank has a capacity of 26 gallons and is located in front and very accessible. The speed of the vehicle is 10 miles an

hour, but this can be varied so as to sait all conditions and requirements. Believing that each kind of trucking requires its own type of body, and that each city modifies these to meet local conditions, the Morgan Motor Truck Company is prepared to furnish any and all designs to meet the desires of its customers.

Screw Discharge Body.

An interesting design produced by the commany, inasmuch as it permits the unloading of coal, sand, gravel, grain, etc., without changing the position of the container, in the serew discharge body, two views of which are presented herewith. It is constructed of setel, having sloping sides, and has an Archimedian screw located centrally and crosswise of the body. Power to operate this is conveyed from the motor through a change gear mechanism, in which an extra gear and shaft lead to a chain wheel mounted on the side of the chassis.

A much larger wheel is mounted on the end of the conveyor shaft opposite to that on which the chute is attached, to which is fastened a key. When this key is withdrawn the chain and wheels rotate felly while the truck is being driven. When the load is drawn into position, the operator slips the key into place, and the motor rotates the screw, and the

contents of the body are discharged. The detachable chute may be raised or lowered to any convenient position, and it requires but a few minutes to attach the device.

DETROIT'S MUNICIPAL MOTORS.

The municipal departments of the city of Detroit are to be almost exclusively endipped with motor apparatus, making it one of the most complete in the country. Types of machines for every public service, including ambiances, patrol waxons, fire apparatus of every description and coal wagons are either now in use or shortly will be. One of the latest vehicles to be ordered by the city is a dog ambulance, for which the General Motors Truck Company has been given the contract.

This will be used by the police department to pick upmind and injuried does. The chases is to be of G. M. C. 1.23-ton type, and the body will be of special construction, eculipped with six compartments having space for 15 cages of different sizes. Each compartment will be provided with swinging doors, and watering troughs will not only provided drinking water, but will assist in keeping the cages cool. Place has been provided for a medicine class, and also for nets and other supplies.

The department has also placed an order with the same company for a 2.3-ton truck to be used by the service men in taking care of the telegraph and telephone lines. It will be provided with a winch to assist in laying cables through conduits and other work of this nature.



Depleting Chain and Sprockets Actuating Archimedian Seren Which is Operated by a

THE EXCLUSIVE ELECTRIC WAGON GARAGE.

Public Service Station of the Yellow Taxicab Company, New York City, Established Six Years, Developed for the Owner of Few Vehicles---Practical Methods and Practise Productive of Economies and Satisfaction

C OMPARATIVELY few public garages are devoted exclusively to service wagon patronage. It is probable that the proportion of the total number is a fraction of one per cent. This condition is due to obvious reasons, the most cogent of which is the doubt by those who now have service stations as to the wisdom of giving attention to but one class of vehicle when patronage may be obtained from ail, especially when the single classification is seemingly as limited as the others are unlimited. It is true enough that many of the garages give service to motor wagons, sometimes a considerable proportion of the total number, but these are the exceptions rather than the rule,

Within the past two years in several of the largest

cities service stations have heen established for the benefit of the owners of machines produced by several of the largest makers, These carages must be regarded as incidental to the general promotion campaigns of the m a nufacturers owning them. and cannot be considered as nurely business propositions. In many instances the builders of vehicles have concluded that

it was essential

to insure the purchasers of wagons a positive service, so far as this could be done, and have decided that the most economical manner of conducting a selling campaign is to educate their customers as to the use and maintenance of their transports.

Attention

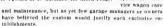
While it is evident that no person desires to be considered. extravagant, it is also apparent that what might appear in itself to be a loss might also be sufficiently promotive to justify its continuance. That is to say, that while the service station conducted by a vehicle manufacturer might directly show no profit, and might be an actual loss, yet the business obtained through its attention might be so large that this delicit, when charged to promotion, would be not only a legitimate but a comparatively moderate expense.

Considering stations of this character it would not be expected that the wagons would be of many different makes. in fact there would be a majority of one line, and the minority would be garaged through necessity or convenience of the owners. I'nder such conditions it would appear that there would be a quality of attention given to the make

the station was created to promote that would be productive of better service. There would be a direct result following systematic care and maintenance of the one make marketed by the garage owner and while these were maintained at as near a uniform efficiency as was possible or practicable. those of other makes would be operated and given such care as the owners decided was advisable. With the one the endeavor of the garage organization would be directed toward insuring service and with the other the results would be dependent upon the resources and judgment of the Theoretically then, the public service station that can

be devoted to a single make or type of machine would be

the ideal, but this is out of the question with the average garage husiness lt must be conducted at a profit, or cease to exist. Being in competition with others, and revenue and net income being dependent upon volume of patronage, it is desirable to attract custom from all owners. There would appear to be a most promising field for the station that would specialize ser-



Without doubt the rapid multiplication of service wagons will impel the location of large stations which will be given over exclusively to these vehicles, just as the pleasure cars are now stored and maintained by numberless stations, and logically the larger these establishments and the more complete the facilities the better satisfaction can be given. The appropriate location for such garages appears to be in the business districts, close to the shops, stores and works of the owners, because it is expensive and needless to drive machines more than the demands of haulage require, and a central point of distribution is obviously the better from every point of view

It is not to be assumed that garage patronage can be drawn from all sections of a community and for that reason it is reasonable to believe that eventually there will be whatever number the husiness demands, exclusive, of



The Main Floor of the Electric Service Wagon Garage of the Vellow Taxicah Company, 116 East 25th Street, New York City, Where I pward of 60 Machines Are Given Proper



Inner Buy, at East Side of Garage, Where the Heavy Trucks and Sight-Sceing Cars Are Stored Beneath the Messanine Floor, course, of the requirements of those who own pleasure the city for the edification of visitors who are unfamiliar with the attractions of the meteorolic. This names we

There are, however, several public service stations that are given over to the electric wagons,, and what is probably the oidest in New York City is that conducted by the Yeilow Taxicab Company at 110 East 25th street, which company succeeded to the electric garage business of the New York Transportation Company, April 15. This garage is by no means the largest in the metropolis, but it was established to serve electric service wagons and it has been continued as such and at the same location for more than six years. The station has a floor area of something more than 22,000 square feet, or about half an acre, available for all purposes, and of this a small section is required for the office and stock room. The garage shelters about 60 machines of all sizes, from the little 700-pound delivery wagon to the five-ton truck, and included among the customers are several sight-seeing vehicles that tour different sections of

the city for the edification of visitors who are unfamiliar with the attractions of the metropolis. This garge was established when the building was completed and it was conducted in conjunction with, but entirely part from, another devoted to an electric carriage service located at Eighth arome and 49th atreet.

More than 11 years ago the first electric service wasons were placed in operation in New York. These machines were regarded by many as being anything but desirable, because they were limited as to speed and to mileage. Not only this, they were constructed to cruide design and were in every way inferior to the machines of today. While slower and heavy, there is no question that they were enduring, and because of this endurance they were then economical as compared with the horse wagons. But the increase of the electric wagons was slow and, as many machines were placed in convenient stations and were shelt-treed in private garages, the demand for a station devoted



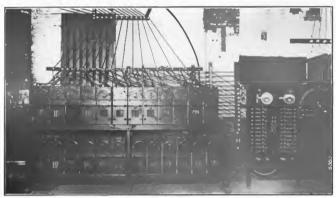
Outer Buy, at East Side of Garage, Showing a Line of the Light Vehicles and the Runnbout 1 sed to Respond to Emergency Culis.

exclusively to them was seemingly very small.

The officials of the New York Transportation Company, however, believed that the utility of the electric vehicle was well established and the garage was equipped with the facilities for ear and maintenance decemed essential to start sife the parrons. The joration was well chosen so far as the businesses section of the city and the demands for delivery were concerned, and as translent patronage was not expected to the problem was to attract and retain customers who was a slow process, for it is was not only necessary to be was a slow process, for it is was not only necessary to be was desirable to promote the use of the electric vehicle as a far as this could be done by reasonable charges and by increasing the efficiency generally.

It is not to be assumed that the system first adopted was all that could be desired. As a matter of fact the operation of the garage could only be assumed and methods were determined after experience had established the concreased longevity and there was leasened expense. It was found practical to establish fixed charges and to insure specified attention, as well as to protect the garate against conditions that might cause a loss. The equipment was also perfected as needs were developed, and it was found possible to provide emergency repairs that were effective and evonomies.

It was established beyond question that the electric vehicle wears slowly, and that the depreciation is exceedingly small. It is not to be expected that machines used day after day in all weathers and generally with maximum loads are to be objects of admiration, because the service is such as will cause deterforation, in appearance at least. The condition of varishs and paint is a matter which the owner can always courted, but asded from this the responsibility of the garage is firmly fixed in his mind. If the standard for economy is known the owner has ambitton to still further reduce it, or increase mileage, or load beyond the normal capacity, all of which add to the problems of care and



Left Section of the Charging Board at the Reer of the Mein Floor, as Exceedingly Complete Installation, Sufficient for Caring for Approximately 75 Machines.

ditions that were to be met with. When the station was first opened few electric wagon manufacturers had sufficiently perfected their machines to atandardize them, and this was a condition that was not conducive to the greatest economy in maintenance, while the cost of batteries and of electric energy was much larger than now. Those facts directed the attention of every owner upon the garage and the management and it was essential to give a service that was in every way businessite, because it is imperative that any industrial wagon shall be operative whenever its use is desired, and the least time lost is the greater recommendation that can be given. Besides this, it was necessary to obtain the greatest battery efficiency and to examine the wagons systematically that adjustments be made and repairs effected to prevent damage and minimize expense.

The results were not accomplished without the exercise of care and judgment and naturally experience brought about methods that were satisfactory in that the mileage of the machines was generally improved, the batteries had inmaintenance. There are, of course, those who are more conservative in their expectations, but this does not generally apply.

The drivers of electric trucks and wagons are not often mechanics; that is, in the sense that they are skilled workers in metals and know motor vehicle construction. It may be said that the majority of them gain their experience with the wagons after they have begun to drive. In other words, few of them have factory training and a comparatively small number have any real knowledge of the use of tools. Many of the drivers formerly drove animal wagons and were given the work because their employer had confidence in their common sense and knowledge of the city when weighed against the possible mechanical ability of a fairly trained driver. It was the experience when the garage was first established that such men were specially desirable from one point of view-that they would obey orders implicitly and could minimize the mileage travelled because of their familiarity with the city, but when they encountered a con-

383

dition that troubled them they were helpless and had to call on the garage for assistance.

With the moderate speed of the vehicles there were fewer accidents of a character that would disable a wagon or truck than might be assumed. One of the principal delays was hattery exhaustion, due to sending a wagon for a work when the energy avaliable was less than was required to cover the milenge actually travelled. That is, it is imperative that no electric vehicle be started with a work that is beyond the power that can be drawn from the battery, and prudence would dictate that there be a sufficient reserve to insure against unexpected consumption of current. Being unfamiliar with electric machines there was a tendency to utilize them to the extreme capacity, with a result that sometimes they were stailed. Besides this the inexperience of drivers often necessitated sending men from the garage to remedy a condition that might have been handled onlie as well by the driver had he confidence in himself. While there was not the actual damage by breakage or as a result the stock room is entered. Back of this is a room set apart for the driver. In this is a series of sixel lockers so that each driver may keep his extra clothing or other property, and there are tables, chairs and setteres so that the men and there are tables, chairs and setteres so that the men series as they are to the other, where the electrical work is performed, is at the station of the company at Eighth avenue and 49th street.

The garage impresses one as being extremely business-like. There is no reason for a driver to remain there unlies during the noon hour or while the battery is being "boost-cd." When the marchine is delivered at the door of the xarage the driver's responsibility ceases. The vehicle is then cared for by the garagemen until it is again called for, and then it is delivered to the driver at the street. Thus it will be seen that the manager or foremen assume a responsibility for the wagons and trucks and this means that the machines are ready for service at the required time or there is the best of reason why they are not. It was



Right Section of the Charging Roard, Showing the Rheostate, Meters and Switches, ood the Record Stand Where the Charging Sheet le Compiled,

of deterioration, there were the annoying delays that necessitated constant attention and supervision.

It was the purpose when the garage was planned to have a sinche floor for storage, this being desired to minimize labor of inneling the machines, as well as affording the drivers the least loss of time when the wagons were taken out or brought into the station. The accommodations were limited because of the need of each vehicle having its own space with sufficient room about it for the necessary work to be performed by the garage men and yet there was no space wasted. The repair shop was installed in the hasement, as was the battery room, but the charging board was forcated against the rear wail of the building. This charging board is in two sections and from it the wiring leads to either adds of the floor.

There is a mezzanine floor at the east side of the garage with sufficient height beneath it for the storage of the largest covered trucks, and under this at the front of the building is the foremen's and manager's office, from which found that this system eliminated any possibility of misunderstanding or error, and the judgmen of the driver was not depended upon when the condition of his vehicle was so important to both the garage and the owner. This interpolation is made here to establish the fact that the experience of the company dictated that dependence should only be placed on what is actually known, and not what is assumed or surmised, while the driver has no responsibility whatever.

There is no doubt that this policy has been not only productive of business, but has created a degree of confidence with the patrons of the garage that is especially desirable, and established it as a business proposition that cannot fall to appeal to a man of affairs. Besides, it placed the sarage care and maintenance solidly on a basis that was not uncorrection.

in conducting a public service station for ejectric wagons it was found that a number of different makes were owned by the patrons and to afford to all customers the same character of atcelled on, care and maintenance, and to insure that the with the least insure that the with the class insure that the with the class of time it was necessary to carry a stock of all parts that might at any time be needed. That is, not only were different lines of standard hardware required, such as and the like, but it was equally essential to have available the different sites servew, cotters, givets, washers, apring clips, and the different sites wised to all machines given attention, as well as the wearing parts of these vehicles. It will be understood that while the components of the electric service electric service derstood that while the components of the electric service and different conveyance, there is a sufficient number in each to make a very large aggregate in a garage stock room when propor provision is made for all the makes garaged.

The parts include rear axies, front axies, steering knuckies, tichars, steering gear piliotos, gears, worms, springs, spyring, sharkles, bushings and husbing stock, roller and annuiar bearings, radius rods, brake rods, brake shoes and bands and brake facings, jackshaft shafts, differential pilions and gears, motor drive shafts, sprockets, chair wagon can be brought to be garage. So far as is possible every need is forestailed and should a wagon be disable tit may be hurried to the station and made ready for service. The simplicity of the electric vehicle is a large factor is its favor, because the usual causes of failure may be dealt with without much loss of time.

With public stations devoted to service wagons because of the machines being worked much of the time during the day the attention must be given at night, so that the greater part of the work upon them is adone after business iours. The night shift is the larger and is added to as the nuceds may require. This means that every department is busy at night, while the conditions actually prevent work when seemingly it might be carried on more economically. An overhaul job or a considerable repair may progress steadily from the time it is becau until completion, should necessity require, as the vehicle is withdrawn from service, but under ordinary conditions Sundays are taken advantage of for work that would require more than a single night, provided the machines may be operated until the work can

be advantageously begun Desnite the character of the work performed in the garage the equipment of machine shop is not especially varied, this including a lathe with a large assortment of tools and attachments, a drill press of sufficient size to serve all purposes, and a forge and a compiete outfit of blacksmithing tools, with every hand tool that might be useful. There is a large machine shop in connection with the other garage of the company at Eighth avenue and 49th street. and there the work that cannot be handled at the truck station is completed. There is, of course, an occasional need that cannot be supplied outside of the specialized machine shop, but such is not often experienced.

The battery room, which is the most important of the grange, always contains spare batteries and cells and trays of cells their are under treatment. The stock room may be requisitioned for elements for different forms of batteries, battery cells, and whatever may be necessary for restora-

tion and maintenance. Some of the owners of several trucks who desire to obtain the maximum service, have extra batteries than can be charged and in readiness for exchange with those in the machines. The hattery room is always in charges of an expert.

In this garage all vehicles are taken on a monthly hasis. Translents are not desired because of the demand for room by those having permanent attention. The charge is based on the carrying capacity of the wagons, as follows:



This charge includes garaging the machine, washing whenever it is used, oiling all of the moving parts and filing the grease cups and packing the wheel bearings, the countershaft bearings, the chain case and completely lubricating



Corner of the Stock Room, Showing the Hundreds of Hins Containing Parts and Vaterinia Carried to Stock, the Spare Wheels and Armstures Used to Make Temporary Re-

brake pedals, brackets, wheel hubs, wheel rims, motor and controller parts, cable of varying sizes, components of the different electrical devices used, and every element entering into the construction of different forms of batteries.

pair, and the Extra Buttery Components,

While it is not to be expected that a garage will have such resources as to make any replacement or restoration whenever it is desired or necessary it is desirable to be able to make temporary regair that will permit the use of a machine until a permanent work can be accomplished. Every hour a service wagon is out of commission means the loss of the roat of whatever is substituted for it, and as this is borne by the owner the need of the garage protecting him and itself against such loss is apparent. In the event of a wagon being stalled through battery exhaustion it may be towed to the nearest charging station and there supplied with sufficient energy to be driven back, but should an axic, wheel or a chain be broken, or a motor burned out through short circuiting, then it is necessary to take whatever part may be necessary and temporarily install it so that the

YELLOW TAXICAB COMPANY CHARGING SHEET STATION 10 NAME No Ann Volt Time Amp Volta

Blank for Daily Charging Record, Arranged for Di Entries, Form 13 Inches Length and 12 Inches Width, Padded. the vehicle; charging the battery each day if the wagon be used, equalizing the battery whenever necessary, and a regular monthly inspection of the machine, this meaning that it is gone over and examined carefully and a statement made of the condition, this being the basis of a report to the owner. These charges are based on the use of lead batteries. Beyond this adjustmenta are made whenever needed but all repairs and replacements are made at additional cost. There is no limitation made as to the current used in charging. That is, a battery is fully charged each night of the day the vehicle was used, but while it may be that a "boost" was given a battery, there is a record of this, no matter whether the charging was at the other garage of the company, or elsewhere about the city.

The attention given requires that each car be gone over at least once a week, when the different moving parts are examined to detect need of repair or adjustment, and whatever work is necessary is performed. But this does not indicate the care given. As each wagon is brought to the door of the garage by the driver he does not drive in, but awaits a shifter, who takes the machine into the huilding, and, if conditions will permit, drives it to the washstand, The shifter is required to note the condition of the wagon so far as operation is concerned. He makes report to the foreman of his findings. The washers similarly note conditions while cleaning the vehicles and also make report. The drivers are required to make report to the foreman of any

condition that should be brought to his observation, and that there shall be no oversight a record book is kept in which each driver notes whatever he believes is necessary. This book indicates special work for each night and when these works are finished the entry is stamped "Completed."

Should the record indicate necessary repair or replacement a special order is needed. When the service period is begun the owner is required to state in writing who is to authorize repair work, and if the driver is given authority, as is generally the case, he signs the entry in the record book if the owner authorizes the repair this may be either verbaily, in which case it is entered by the foreman, or by letter, when a similar entry is made and the letter filed.

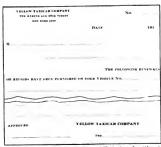
After the vehicle is washed it is placed in its regular space or stand in the garage and placed on charge. When the charging is begun an entry is made on the charging sheet, which will take 90 entries. The entry gives the name of the owner, the number, if several are owned by the same man or firm, the time the charging was begun and the amperage and the voltage, and the time, the amperage and the voltage when the charging was completed. This charging sheet is made out daily and the record is checked by the battery man as being correct. Each day this record is copied into a book in which each vehicle garaged is entered and against this entry is the number of times the battery was

To				
		Date_		
	H WESTER	0	Print	
			_	
			-	
			-	
_				
			-	
				-
			-	

	of Regal							
	75 Inches	Width,	White	Paper,	Padded	with	Order	ne
Stock H	loom,							



Copy of Requisition for Stock, Same Size as Original, Printed bellen Paper, Padded with Stock Charge, Written with I arhan,



Repair Memorandum Binnk, Form 8,25 Inches Length and 5,25 Inches Width, Undded,

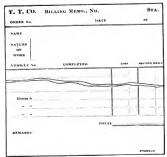
charged. The charging sheet and the record should coincide. The inspections are made each night, from 10 to 15 machines being inspected, the time required being from 10 to 30 minutes, the attention the vehicle has been given being a basis of this work. The record of each inspection is noted on cards and each day following the conditions as found are brought to the attention of the driver or the owner, and if necessary a letter is written to insure that the facts are not overlooked by the necessary authority. These reports and the letters indicate the work needed and the probable cost. The cards and the copies of the letters are filed, together with a note of the disposition of the subject. The batteries are inspected at least once a month, and generally oftener, when they are equalized and given other attention. The service requires that they be properly maintained, but replacements and repairs are regarded as extra work. The record of each battery is kept on cards and it is possible to learn the exact service of every battery for a period of more than five years. Before the time set for examination they are looked over and any unexpected change is detected, aithough the operation of the machine will usually develop any untoward condition.

Record of all the service work is kept, regniar attention being charged to labor, and the supplies used to garage suppiles, these being regular items of expense, but all labor on special work is kept on time cards by the foremen and from these cards the entries are made for the bills. When stock is required from the stock room a requisition is made out on a blank designated as a "Stock Charge." The entry indicates the quantity, a description of the article, the requisition number, the price of each article and the total amount. The price and the total amount are not filled in on the original, but the other entries are made in duplicate with carbon on a yellow sheet designated "Order on Stock Room," which is addressed to the stock clerk or foreman and authorizes the delivery to bearer of the articles entered on the original sheet. The yellow sheet is signed to indicate that the articles were received from the stock room. The original or white sheet, with the price and amount columns filled, is first approved as to items and totals, and is then sent to the office, where it is received by the general ledger clerk, who credits the stock room with the items and the total, this account being dehited, of course, with all receipts of stock. The entries in the general ledger are indicative of the value of stock rather than character and volume, but entries on the yellow "Order on Stock Room" are posted to the stock cards, which are kept in file form,

the sard record constituting a perpetual inventory, each card showing the receipts of and deliveries from the stock room. The difference between the debit and credit entries should show the exact quantity and vaine of stock represented by any siten card. The stock cards are posted each night from the stock orders and the entries are cross checked so that the record of the stock cards is not only dependable, but it can be proven with reference to any particular article in a very brief time. A general record, aside from the general ledger, shows the daily receipts and deliveries of stock. Both the "Stock Charge" and the "Order on Stock Room" forms are permanently bound in loose leaf shiders.

All orders are carried in the records by number and each vehicle is further identified in the event of an owner possessing several. Thus in the "Stock Charge" both number and name, and possibly other designations will appear. When a repair job is begun two records are begun. The one is the billing memorandum, in which the garage or station is specified, and following this is the order number and the date, the name and the nature of the work, the vehicle number, and the date of completion. This blank allows 14 entries for stock requisitioned. The blank is made out by the foreman and with it, when the work is completed, are the time cards. The cost of the stock is entered in the cost column and the selling price in the selling price column, and to these are added the labor at the cost and selling price, and the whole is totalied. Under the head of remarks is entered any record desired by the foreman, who signs the memorandum as being correct.

The other record carries the order number, the date, the name of the owner and the address, and a statement of the renewals or repairs on the vehicle specified and this record is submitted to the owner or the driver (if authorized to order work) for his examination and approval. The name of the garage representative is attached to this form and when the vehicle has been looked over, if desired, to verify the record, the owner or representative is required to approve the facts as set forth. Then the bill is made out in typewritten form from the billing memorandum and this is sent to the customer. It will be noted that this record, though simple, is very thorough and that it is possible to verify every item of stock or lahor from the requisition forms and the time cards, as well as the cost and the seiling price. The customer does not see the billing memorandum, which indicates the difference between the cost and selling



Form for Billing Memorandum, Form 8.25 Inches Length and 5.25 Inches Width, Padded.

price, which is proven by the original records. Every item can be substantiated or error eliminated.

Aside from the regular monthly service charge extra work may be much or little as the case may be, but all service is moderate in cost. The attention that the garage gives is demonstrated by the fact that there are armatures of varying makes and sizes kept ready in the stock room, so that in the event of damage on the road a crew can be sent out to substitute one of these for that damaged, and the vehicle not only brought back but operated until a repair can be made. Spare wheels of all sizes are always in stock ready for substitution for those damaged. These can be similarly used. In fact, it is difficult to conceive any accident that would cause the withdrawai of a truck or wagon from service for more than a brief period, and it might be said that under ordinary conditions withdrawais are very infrequent, unless for an overhaul. A spare battery can be substituted, and minor replacements can be temporarily

if not permanently made in a few hours.

The garage was established to keep the trucks in service and this is the main object. Obviously an owner cannot provide against service emergencies unless he has a large cutoment and a garage of such proportions that he can afford to do so economically, while with the attention siven him at the Yellow Taxicab Company's station he simply pays for what is necessary and its resources afro always available. Not only this, the experience of its organization is exceedingly valuable to him, because his own must be more or less costly unless he is guided by expert advice and has the service of trained electricians and mechanics.

The capacity of the garage has been reached. There is every reason to believe that it will be increased, for there has been very rapid lucrease in the use of electric conveyances in New York. There are, obviously, equal opportunities for stations of a similar character elsewhere. They will be established as public confidence in created.

MAKER OF CROXTON TAXICABS REORGANIZES.

A NNOUNCEMENT is made by the Croxton Motor Company, maker of motor cars, taxleabs, etc., with present factory at 2260-2264 East 69th street, Cleveland, that it has prepared plans and is receiving bids for the erection of a The Croxton company has secured seven acres of land with suitable railroad frontage, and the new plant is to be constructed of structural sieel, concrete and brick. The main factory will be 120 feet wide by 500 long, with struc-



Proposed Plant in Be Erected by the Croxton Motor Car Company at Washington, Penn,

complete new plant at Washington, Penn., which it expects to occupy about Aug. 1. The concern will be reorganized under the laws of Pennsylvania, and will be known in the future as the Croxton Motor Car Company.

J. P. Stottz, who is president and general mannaer, will retain these positions under the new regime. The Wash-locton capital is represented by the following directors: John H. Donnan, vice president of the Cittzens National Bank; A. M. Lun, president of the First National Bank; A. C. Warze, tressurer of the Washington Trust Company; D. B. Bigger, director of the Real Estate Trust Company; C. S. Caldwell of the A. B. Caldwell Company; G. W. Dudderar, managing secretary of the Washington Board of Trade, and J. O. Brownson, attorney at law and director of the Washington Trust Company.

The decision to remove to Washington was influenced largely by the fact that this city has natural gas in abundance and that it is so situated that the cost run of bituminous coal is \$1.35 a ton. The charge of electric power also is surprisingly low. Haw materials are immediately at hand, and labor, both skilled and unskilled, is easy to obtain.

tural steel spans 40 by 25 feet. Every attention will be paid to the matter of light and ventilation. The capacity will be 1000 cars a year.

PITTSBURG TO SAVE MONEY.

The authorities of Pittsburg, Penn, have figured that they can axe the city the sum of \$15,000 a year by operating motor trucks instead of horses, in hauling asphali. An order has been placed for these sixton Alexa, fifter a rigid investigation which showed that they could do the works with great recommy. Dumpling bodies are to be provided and each truck will carry material for seven square yards of street surface.

ELECTRIC PATROL FOR MEMPHIS.

Memphis, Tenn., recently advertised for bids for furnishing an electric patrol wagon with a capacity of 2000 pounds, fully equipped, including stretchers and all the usual patrol appliances. According to the announcement, the machine to the furnished subject to 80 days trial.

INTERNATIONAL LIGHT DELIVERY AUTO-WAGON.

COST and efficiency in the delivery system are important factors and receive serious consideration by the small merchant contemplating the replacement of the horse drawn



Outlining Water-Cooled Motor and Its Components, All Paris Being Easily Accessible and of High Grade Material,

equipment with the more progressive mechanical transport. Equally interested is the farmer residing several miles from the city's markets and who in certain seasons makes daily trips transporting the product of the soil. While it is an accepted fact that the automobile will accompilial from two to four times as much as the horse, the first cost of the former and that of maintenance are studied carefully.

in designing its product the International Harvester Company of America, Chiengo, made a careful study of the haulage problem and the numerous plants of the concern afforded ample opportunity to test out the different models in actual work. The experimentation include service under all conditions and throughout the car was subjected to asvere tests hefore It was already unon the market.

Although a wide variety of bodies is manufactured to meet the individual requirements of the purchaser, the chasses, the chasses the which these are fitted are designed to carry 1000 and 1500 pounds. The general design is similar with the exception that the 1500-pound chassis is strengthened to take care of the additional weight. A feature of the international auto-wagon is the choice of either air or water-cooled motor, two types of 1000-pound whelse being produced.

The air-cooled models are known as M A and A. the latter being equipped with larger rear wheels, while the water-cooled types are also designated by fetters, M W and A W, being identical with the first named with the exception of the method of cooling. Both types of motors are rated at 20 horsepower the engines being of the double opposed horizontal type and their location is such that the weight is equally distributed upon the four wheels, facilitating traction, especially in soft or muddy roads.

Power Plant Accessible.

Throughout, the power plant is noticeable for its accessibility and simplicity. It is assepted on a steel sub-fraue under the body and it is pointed out by the maker that any of its components may be replaced easily, and that the evides of an expert are not required because all parts are strictly interchangeable.

Both motors are of the four-cycle type, the water-cooled having a 4.5-inch bore and five-inch stroke. Cooling is effected by a centrifugal pump which takes the fluid from a large vertical tube radiator and forces it through ample water jackets. The usual fan is employed.

The crankshaft is of high grade heat treated steel of ample size and the bearings are large, being of phosphor bronze and lined with a special habbit metal. The connecting rods and wrist pins are large, being designed for leavy service, and the bearing of the former is of such

dimensions as to insure durability and smooth running. The small end of the connecting rod is fitted with phosphor bronze, moving on a hardened wristyin. All bearings are carefully fitted and tested, passing several inspections in the assembly

The camahaft is a special alloy steel, heat treated, and the came are forged interral. After hardening they are ground in a special machine linuring correct form and accurate opening and closing of the valves. The latter are mechanically operated and are of the rocker type making for high power efficiency. A feature is their accessibility. By removing a retaining bolt the entire valve mechanism any be withdrawn for inspection or grinding. The housing is machined to an accurate fit eliminating the use of gaskets. The working parts of the rocker mechanism are of special material, carefully hardened, and provision is made for proper lubrication, reducing work to a minimum.

Double ignition.

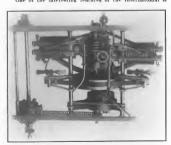
A double system of ignition is utilized, consisting of dry cells and timer, and magneto. The latter is located on top of the motor and is gear driven. A form of Oldham coupling permits the removal of the member when desired. The secondary wires are enclosed in weather proof tubing and their grouping is such that they cannot come in contact with the components of the chassis when traversing rough roads.

Lubrication is by a mechanical oiler located conveniently on the right hand side of motor and 10 individual adjustable feeds convey the lubricant to the working parts. The cams and gears within the crankcass are lubricated by the splash system and the level is always maintained properly, insuring correct operation of the motor.

Ciutch and Transmission.

The clutch is exceedingly simple as well as effective. It is operated by two cams which engage two rollers on the end of the clutch levers. These contract the clutch bands around the wheel so tightly that slipping is impossible. Each half of the band is adjusted by a hexagon nut which may be turned and locked easily as the clutch is conveniently located. The latter is fitted with a special limits of long life.

One of the interesting features of the international is



r-l'ooled Type of Motor, Showing Location of Transmission, Method of Drive and Pan-Cooled Exhaust Valves,

the simplicity of the transmission and its operation. It provides for two speeds forward and reverse, all operated by one lever located at the right of the driver. The teeth of

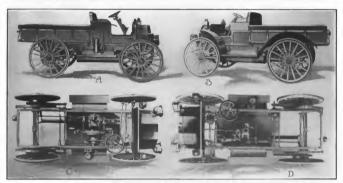
Dis Less by Google

the transmission are always in mesh climinating any posable chance of a carciesa operator striping gears. Each of the transmission members is composed with internal rarchets, and masks with each which protruct strough the hollow shaft engage these members. The controlling lever salide operates in the shaft and throws the pasks into contact with the ratchets in the gears as will be noted in an accompanying illustration. Whenever the use of a given speed is desired all other pasks are thrown ont of engagement automatically. A simple lockting device makes it impossible for the operator to shift from one speed to another without disease, and the salide is a supersistent of the past of the controlled of the past of the past of the past of the past of whom the past of the past of the past of the past of the past operated, it being posited out that a child may change ascerds, so little pastion is required.

All years are enclosed in a substantial oil tight casing and operate in a bath of lubricant. The supply is replenished easily when needed as the filter member is convenient, and in addition a drain cock is fitted to the bottom of the housins, permitting the withdrawal of the old lubricant. All gears have large faces, insuring durability. They are of bronze and steel, accurately machined and finished. The addition the device makes for economy in fuel as warm air is taken in through the opening of the tube which is in proximity to the heated cylinders.

The frame is of carefully selected reinforced wood with interlal sub-frame and cross bars. Springs are full elliptic, both front and rear, 36 by 1.5 inches in models A and A and A way, and are securely anchored by substantial clips. Two sets of brakes are utilized, the service being of the external as sets of brakes are utilized, the service being of the external and operated by pedal, while the lever operated emergency is internal expanding on the rear wheels. These members are of unusual size.

The wheelbase is 90 inches in both air and water-cooled models. Model A A and A W are equipped with 38-inch wheels in front and 42 rear, both being fitted with roller bearings and show with 1.5-5 inch solid slide wire trees, Models M A and M W are fitted with 38-inch wheels, front and rear with 2-inch front and 36 by 1.75 rear. Two-inch tries are 18 by 1.5-inch front and 36 by 1.75 rear. Two-inch tries are furnished for both front and rear on special order for models A A and A W, and 2.5 rear on models M A and M W. Large tires are removemeded for both drawy loads.



International Auto-Wagon: A, Panel Express Type of Body with Removable Finre Boards Fitted to Mr-Cooled Motor Chasals Depleted at C. B. Model W. W. Having Two-luch Tires and Detachable Body: B. Chassis Equipped with Water-Cooled Motor, Dullings Accessability of Components.

pawls and other components are made of a special grade of steel and are heat treated. It is claimed by the maker that not only is the transmission noiseless but seldom needs attention other than lubricating.

Double Chain Drive.

Power is transmitted from the motor to a countershaft and thence to the rear wheels by sprockets and chains. The latter are of liberal size, and the sprockets are cut carefully and of durable material. The driving and driven sprockets are sufficiently high from the ground to be naffected by mud. Two substantial, well designed torsion rode insure perfect alignment. The brackets carrying the countershaft are slotted and either side is fitted with adjustable boits and locking nuts, making it an easy matter to maintain the proper distance between the sprockets. The torsion rode are also adjustable.

A Schebler carburetor is utilized and the air intake is fitted with a vertical standpipe preventing the suction of the motor piston from drawing in dust or foreign elements. In The throttle and spark levers are mounted on the steering column at the right and the unand wheel is utilized for steering. The fuel tank is located in front, making for easy reglenishment and the earburter is supplied by gratity feed. The gasoline capacity is 10 gallons, ample for long trips.

Air-Cooled Models

The air-cooled model is fitted with a four-cycle, horicontail double opposed motor having a five-inch hore and as stroke. Each cylinder has 23 separate and distinct radiatiing fine insuring proper cooling under the most severe conditions of service. A belt driven fan, fitted with a tensionority of the cooling of the cooling of the cooling of the cooling. The straight line exhaust pipe is of liberal area permitting free extress of the burnt gases.

A feature of the fan arrangement is the provision made for lubrication, oil being forced to their bearings by the mechanical oiler. All parts subject to friction are provided with grease cups in addition to the regular oiling system, The standard equipment includes one seat, fenders, two gas headlights, three oil lamps, generator, horn and tools. On special order the following will be supplied: Rear seat, anti-skid chains, supplementary cross springs, double too to cover two seats, top for front seat, combined speed-ometer and odometer, storage battery and Prest-O-Lite tank. Variety of Builtes.

Models M A and M W are fitted with panel express type of body, 73 inches iong and 42 wide, Inside dimensions, and have an 11-line) panel and 6.5-line) removable flare board. Models A A and A W are equipped with the asame type, the inside dimensions being 67 inches from back of front seat and 35 inches wide, with a line-inch panel and 4.75-inche removable flare board. The panel express bodies are removable flare board. The panel express bodies are removable flare board and a similar board of the panel express bodies are removable flare board. The panel express bodies are removable flare board.

A special top of standard construction is also manufactured for attachment to models M A or M W panel express types and is equipped with side and rear curtains, completely enclosing the body. A storm front, comprising a front and two side curtains with celluidoil lights, is extra. The double top and rear seat arrangement will appeal to those who desire the use of the machine for pleasure purposes, as by it the occupants may be protected fully from the weather. The international Harvester Company of



Sectional View of Constant Mesh Gene Type of Transmission, Showing Dogs Engaged in Pawis,

America produces a number of different body designs and points out that users of its auto-wagon are assured of efficient service as the concern has hranch houses or representatives in all of the important cities and towns.

TORONTO TO OPERATE 'BUSES.

Toronto, Can., is to operate a line of passenger 'bused with the idea of discovering their practicability and interesting private capital. Chief Engineer Rust is preparing a report upon the matter which will be presented to the city council. It is thought that four or five machines will be run at first as an experiment, and the idea developed on a larger scale if found successful, with the aid of private capital. At present any company can operate bus filters on the street, as no franchise is required. It is stated that an English concern has been considering the opportunity offered by transit conditions in the city, and will probably have machines on the streets in the neaf future.

PIERCE-ARROW WELCOMES VISITORS.

The Pierce-Arrow Motor Car Company, Buffalo, N. Y., maker of the weil known Pierce-Arrow worm driven truck, le quite a hospitable host to visitors at its factory, providing guides who follow a carefully mapped out route in conducting sight-seers about the plant. The guides are provided with instructions, the first paragraph of which reads:

"It should be remembered at all times that this company is not doing visitors a favor by showing them through the factory, and the conduct of the guides in every instance, should be governed by the fact that every courtesy shey show is due the visitor in return for the opportunity he gave us to show him through the buildings. The outward appearance of the visitor and whether he is apparently a prospective huyer of a car, must not be allowed to govern the conduct of the guides. A seneral invitation to visit the Pierce-Arrow factory has been extended to every one who may be interested, and anyone coming here with a desire to see the plant is the guest of the Pierce-Arrow Motor Car Commany and is to be treated as such in every respect."

MIDDLETOWN'S FIRE WAGON.

Chief Pitt of the Middictown (Conn.) for department has given out the figures of the root to the city of the Pope-Hartford ehemical wagon, made by the Pope Manufacturing Company, Hartford, Conn., which was bought two years ago. These figures show that the machine effected decided economy when compared with the horse equipment which it displaced. During the two years it has been in service, it has answered 139 sairms, and has cost to maintain only 189-14, as compared with horse maintenance expenses of \$1909.41. The respective costs are tabulated as follows:

Motor-	Iturse Truck-
Gasoline \$23.20 Oil	Shoeing 185.95
Tires	
	\$15000 48

This shows a difference of \$1809.67 in favor of the automobile, without taking into account the greater speed in reaching a fire and consequent saving to the property owners.

TAUNTON'S MOTOR CHEMICAL

The department in Tauuton, Mass., has taken delivery of a new motor combination cleimed notine and how wagon, built to special design by the Pope Manufacturing Company, Hartford, Conn. Of course, the classis is the result and popellariford construction, but the body work follows the lines develoomed by Chief Frederick A. Lennard.

The rear portion is built in two compartments, each of which will hold 500 feet of regulation fifth hose. Both of occurred to form seats for the crew, while the ladders are so covered to form seats for the crew, while the ladders are so arranged along the sides as to provide hacks for these earths. The chemical tank also is covered, and provided with a Pifer head, held to be the latest improvement.

It is anticipated that the new machine will displace six horses, this equipment answering alarms formerly covered by two hose wagons and a chemical engine. It is unnecessary to add that the saving in expense will indicate a declied economy.

FLORIST USES FORD WAGON.

A. W. Brendt, a florist of indinanpolis, lind, has thoroughly demonstrated the economy and convenile-nee of the flow that the from morning until light delivery wagon. He uses a Ford and keeps it busy from morning until light, occering the city and making frequent trips into the country, at times running 150 miles and a day. One recent journey was to Romese, Ind., a distance of 62 miles, and the round trip of 126 miles was made with-not difficult to the control of the

New 6mmercial @rAccessories.

Caldwell Gas Tuhing.

The Caldwell tubing will appeal to those who have had tronble with actylene lamps due to leaky plping, as it has been designed especially to eliminate the defects of the usual products. It consists of a heavy and high grade rubber tube covered with braid by a special process which weaves the fashric closely without diminishing the flexible qualities of the tube. The covering protects the rubber from the air, thus keeping it soft and considerably lengthening its life, and the tube is stated to be sorticeable as long as the braid is intact. The weather will not affect it as it does ordinary uncovered rubber tubing, which it renders hard, so that it cracks easily, the Caldwell tubing being protected from the oxygen of the air, and retaining its fischillity. It is made by the Caldwell Manufacturing Company, 1756 Cranston street, Providence, R. I., and is inexpensive.

The Volkmar Starter.

Self-starters for motor trucks are coming more and more into prominence, and when not a part of the standard equipment, are often installed by the owner. One of the newer starters is the Volkmar, made by the Volkmar Auto Starter Company, 203 Broadway, New York City. This is of the apring type, and is especially designed for attachment as an extra accessory, requiring no mechanical changes in the car to install. Pressing a pedal on the dash releases the springs and turns the motor over several times, the two powerful springs unwinding. When the motor starts it winds the springs again, ready for the next starting. The instrument is simple in construction, having only 28 parts, and is eight inches in diameter and seven inches long. It is fastened to the car in place of the starting crank. It is made in two sizes, one for motors of up to 30 horsepower. and the other up to 60 horsepower,

Nolosa Battery.

One of the newer ignition hatteries, is the Noloss, made by the Burn-Boston Battery & Manufacturing Works, ? Donne street, Boston. It is a combination of the liquid battery in the dry battery form. The batteries are delivered sealed ready for use and are of the liquid type, giving the

same voltage and amperage as the regular dry battery and taking up the same space. Though a liquid is used, there are no fumes, and the fluid cannot leak, freeze, or evaporate. When not in use, the cells do not lose amperage.

Vivon Hoen

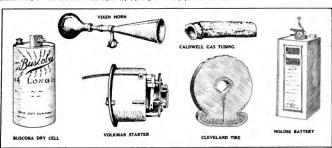
Motor truck users who have been considering the horn problem will no doubt be interested in the Vixen, made by the Motor Car Equipment Company, 55 Warren street, New York City. This is distinctly a new type, though its outside appearance resembles an ordinary buth horn of the reed variety. Instead of the reed, however, there is a small mechanical sitem which emits a characteristic sound of great penetrating power. This sound is said not to be unpleasant, and the horn can be used in hoth city and country.

The Buscoba Dry Cell.

The Buscoha dry cell is made by the Bush-Scot Company, Detroit, to meet the demand for a high grade special dry battery of long life and unusual recuperative powers refor use with ignition systems. It is of the usual force equipped with serve terminais, and is covered with a yellow wrapper in order to distinguish it from other cells.

Cleveland Air Cushion Tire.

This is a novelty in solid tires, made by the Cieveland Puncture Proof Tire Company, Columbus, O. It might be more properly called a non-inflated tire, for as may be seen by the illustration, it is not solid, but has an air chamber in the middle. The air in this is at atmospheric pressure only. and communicates with the outside air through a slit in the base of the tire. It is claimed that when the tire strikes an obstruction, the pressure closes the slit, resulting in the air being compressed and adding its resiliency to that of the rubber. Around the clincher, the tire is covered with several layers of friction cloth, which prevents cracking, and the tread is beaded, to prevent skidding and give a large wearing surface. The tires fit any standard clincher rim, and can he used on any wheel fitted with that style of rim. In appearance and size they are similar to the ordinary pneumatic shoe.



Views of Some Interesting and Valuable Accessories for I so on Motor Trucks, Including a New Type of Ignition Hatter), Improved Gos Tobing and a Starter,



JUNE, 1912.

AUTOMOBILE JOURNAL PUBLISHING COMPANY Times Bldg., Pawtucket, R. I.

William H. Black, Treasurer. D. O. Black, Jr., Secretary.

Dublishers of

THE AUTOMOBILE IOURNAL THE ACCESSORY AND GARAGE JOURNAL Phone Pawtneket 1000,

EDITORIAL DEPARTMENT CARL A. FRENCH C. P. SHATTUCK.

WILLIAM W. SCOTT

ADVERTISING DEPARTMENT

New Engined... John W. Queen, 6 Beacon Street, Boston, Ma atral States W. R. Bledgett, 25 West 42nd Street, New York City.

'Phone Bryant 3728, Western States

G. A. Eldredge, 304 Sun Building,

Detroit, Nich. 'Phone Cherry 1963, P. G. Larian, 4707 Magnolia Ave., Chicago, Ill.

PUBLISHED THE FIRST OF EACH MONTH.

SUBSCRIPTIONS:

The United States and Mexico, the year, \$1 in advance; Can-ada and Foreign Countries in Postal Union, the year, \$2 in advance. Fiftees cents the copy.

ADVERTISING RATES:

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding. Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire, and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 19tt, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

STUDYING TRANSPORTATION COSTS.

One of the most important features connected with the widespread use of the mechanical conveyance is the incentive to study the cost of transportation methods. It was somewhat surprising to those interested in establishing the newer equipment to find that many manufacturers and other business men, who were able to tell to several decimal places the cost of each step in the production of goods, were utterly unable to tell the expense of getting these goods to the customer except in a lump aum. In fact, the yearly total was not known with any degree of accuracy in many instances.

When the motor truck salesman began to interest these people in the advisability of replacing antequated methods with the industrial transport, he very naturally reduced his figures to costs a ton-mile, only to find that he was discussing a situation about which the man to whom he was talking knew practically nothing. As a result, the transportation manager has become a decidedly important factor in any line of husiness endeavor.

A careful study of local conditions is necessary, and a comprehensive record system must be installed. This must enable leaks in the delivery organization to be discovered. as well as the cost of every item of operation in the rather

complex problem which bauling presents. By a careful examination of these records, the cause of any increase in the total cost should be discovered readily, as well as leaks and opportunity for Improving the system. Most truck manufacturers are able to install such systems for their customers

The factors of economy and efficiency form the basis upon which the owner must determine whether or not be shall discard bis present equipment, and they likewise present the information upon which he and the truck manufacturer or salesman should arrive at the answer to the question as to what type of mechanical transport shall be selected

THE ARMY SITUATION.

While there has been some disposition to criticise the War Department for its apparent attitude toward the motor truck as a substitute for the army mule, the statements embodied in a recent article by Capt. Alexander E. Williams, 19th Infantry, U. S. A., would seem to Indicate that much activity has been manifest on the part of the government in this particular field. Capt. Williams not only gives figures which prove conclusively the economy resulting from the use of mechanical transports, but maintains that the United States is ahead of other countries in the development of machines for field use.

It is significant that the government has decided to continue the experimentation which was begun last year in connection with the various military manoeuvres throughout the country. Apparently this has been with a view to arriving at some definite knowledge as to the availability of these vehicles for field service. If, as Capt. Willlams claims, this is a decidedly progressive step, then Amerlean manufacturers have nothing to fear in awaiting the final decision of the army officials.

The effort of the department to secure information regarding the trucks now owned and utilized by private concerns and individuals is along the lines followed by the government of Great Britain. Whether or not a subsidy will result is of importance, particularly when viewed from the standpoint of the manufacturer and owner. It is concelvable that the final action of the government in this matter will prove of decided and financial interest to the commercial vehicle industry-quite as much so as if it were considered wise to purchase outright trucks in quantities.

ELECTRIC VEHICLE DEVELOPMENT.

Those who are giving serious consideration to the study of the motor haulage problem cannot help but be convinced that the place occupied by the electric vehicle is growing decidedly more prominent each month. When large concerns are to be found with equipment aggregating over 100 machines of one make, it must follow that these are giving satisfactory service, to say the least. Another significant factor in this connection is the frequent announcement of repeat orders of quite substantial proportions. It is evident that the electric has its own particular field, in which it can compete with eminent success.

NEWS OF THE ELECTRIC VEHICLE FIELD.

Bakers Prove Decidedly Successful in Express Service---lce Cream Concern Favors

Detroit Cars--System as Applied to Bread Delivery---Cost Figures Based on

Experience of Chicago House---Features of New G. M. C. Design.

While it is true that many breweries are utilizing electric trucks in large numbers, it is significant that among the largest purchasers of this type of vehicle are the express companies. Before the American, National, West-cott and other concerns made a radical departure from their former method of delivery service, they tested out several demonstrating cars, which were placed at their disposal by the manufacturers of the country, to prove their efficiency and economy under any and all conditions.

These tests covered a period of years, during which time the express companies kept accurate record and tabulation of the performance of each car. Machines of the same type but of different makes, were put in direct competition, ranning under the same service conditions, and this these are employed for the latter to provide against possible distortion.

The steering gear and controller are connected in a very compact manner, and are rigidly attached to the chassis, being devoid of all silmsy connections. The controller is a patented continous torque drum type, and is enclosed in a dust and water proof case. Five speeds forward and reverse are provided. No pedals or switches are used in connection with this controller, and all speed changes are gradual and accomplished without waste of current.

Special attention has been paid to the matter of wiring, this being rendered acid and weather proof and so arranged as to be free from all mechanical strains. All connections



Fleet of linker Electric Two-Ton Vehicles in Operation with the American Express Company, a Type Utilised by it in Several Cities.

period of experimentation was a time of discovery to the express companies.

They learned of uses for the trucks, of which even the makern themselves were not sure, and an a result of all this, the express companies were able to make locical selection without bias of the cars which had proved themselves best adapted to their needs. They are now purchasing electric trucks in large quantities. One of the most recent orders placed with the Baker Motor Vehicle Company, Cleveland, O., maker of the Baker electric, was a repeat for 25 two-ton cars for use in Washington, Baltimore, New York and Chicago.

The motor in these cars is of the special (our-pole design series wound, with unusually large commutator, which is claimed not to spark or blacken under the heaviest load and to possess an electrical characteristic which permits of 200 per cent, overload. The motor and countershaft are completely self-enclosed in dust and water proof cases. They are connected by Reynold silent chain, which is enclosed and runs in oil. The armature shaft and counter-shaft run on imported annular ball bearings and four of

are securely locked. Every part of the working mechanism requiring attention, adjustment or jubrication is made conveniently accessible from the outside of the vehicle without disturbing the body or the load.

The frame is of pressed steel of special design, giving unusual strength and likhthess. A particular method of chain drive is employed, permitting the flexible suspension above the springs of the entire power plant, and a light solid rear axie construction of unusual strength. Both axies are drop forged steel with integral spring seats, and are equipped with roller bearings of standard design.

In addition to the contract mentioned above, the Baker concern has filled the following during the last 30 days: Westcott Express Company, New York City, 12 two-ton express trucks; Public Service Gas Company of New Jersey, two one-ton vehicles for construction work; Public Service Railway Company of New Jersey, one two-ton ear with collapsible extension tower for line work; benyer Light & Power Company, wo-ton; Maldow, Beteric Company, Maldon, Mass, one-ton; Town of Peabody, Mass, 1000-pound wagen; Cambridge Gas & Light Company, Cambridge Gas & Light C

bridge, Mass., 1000-pound; D. Goff & Sons, Pawtucket, R. 1., two-ton; Southern California Edison Company, Los Angeles, Cal., 1000-pound; F. M. Christianson & Son, Akron, O., one-ton truck with special body for hauling marble slabs

DETROIT ELECTRIC FOR ICE CREAM

The delivery of ice cream requires some special provisions in the matter of vehicle equipment, owing to the necessity for packing the product in ice and sait. This applies particularly to the body, and the accompanying illustration, being that of an ice cream delivery wagon employed by the Luick Ice Cream Company, Milwaukee, Wis., brings out the method utilized by this concern in solving this portion of the problem,

The car is a Detroit electric of 3000 pounds capacity, made by the Anderson Electric Car Company, Detroit, It is maintained, both by the maker and the owner, that the nature of the ice cream business is such that an electric vehicle can be used to a much better advantage than one propelled by gasoline. This is due primarily to the numperience of his company with a fleet of 100 light delivery electric vehicles, made by the Ward Motor Vehicle Company of New York, in the delivery of bread. The company began to utilize electric cars about six years ago, and has increased its equipment gradually, from time to time, until at present it consists of cars of various sizes and load capacities. The talk was confined to the results obtained in the Bronx, where 100 1000-pound wagons are employed.

The vehicles are of the completely enclosed type. A set of sliding doors at the rear of the driver's seat affords easy access to the main portion of the body, while double doors at the rear furnish additional means of reaching any part of the Interior. The wagon sides are lined with galvanized fron, as also is the floor, this latter being made removable.

The internal arrangement of the garage and loading platforms were explained by lantern slides. Briefly, it may be said that the garage organization is extremely simple. The nominal head of the department is the plant manager. Under him and reporting directly to him is the garage superintendent, who is responsible wholly for the care of

the vehicles and their condition. The plant engineer is responsible for electric equipment from the main nower plant through the charging equipment and to the end of the charging plug. Beyoud this point the responsibility rests entirely with the garage superintendent. Three divisions are directly under the superintendent, these being the inspection and repair, washing and polishing, and hattery charging and repair.

Three sets of records are kept, a daily vehicle report card, a five weeks' report and parts' renewal card. The first is used daily by each operator. A clean record card in a pocket in the front of the car is notification to the driver that the machine has been properly inspected, repaired, washed and charged. Should no card be found he must report immediately to the garage superin-





Detroit Electric in Service with the Luick Ice Frenm Company, Milwaukee, Wis,

ber of short stops required on most of the delivery routes.

The truck shown has been in service for a number of months, and in its operation two men are employed. This makes it possible to serve a large number of patrons, including stores and private consumers, in the course of a day. It is covering from 30 to 40 miles daily, without difficulty, replacing three horse drawn wagons and making an excellent showing for economy and efficiency.

As is true of all Detroit electric vehicles, the car is equipped with the Edison battery, this particular set consisting of 60 A-G cells. The wheelbase is 96 inches; the trend, 62, and the road clearance, 11.5. The overall dimensions are: Length, 155 inches; width, 74, and height, 100. The height of the platform from the ground is 35 inches. Tires are solid, 34 by 3.5 inches in front and 36 by four in the rear.

WARDS IN BREAD DELIVERY.

Charles A. Ward of the Ward Bread Company of New York City, recently gave an interesting talk before the Electric Vehicle Association of that city concerning the exa substitute is provided for the day.

The daily report is kept by the driver, until he is through for the day. It then bears his name, vehicle number and information as to the number of trips he has made, and the condition of the vehicle when it was turned In for the night. Accidents also must be reported on this card, which when completed, is turned over to the garage superintendent. The latter dispatches inspectors and repairmen, who make any necessary adjustments and repairs, oil the vehicle and turn it over to the washing department.

This completed the car is turned over to the charging department and made ready for duty the following morning. Records of all repair parts utilized, time required to install the same, the number of volts, amperes and time

required to charge the battery, also appear on this card. Each "five weeks" card covers information for a period of five weeks on each vehicle. Such information as the following is entered: Date, condition of vehicle, battery number, miles a day, power, accident, repair and total costs, route number and any additional remarks.

The last record card is a renewal of parts sheet, which

embodies the vehicle specifications, factory number, date put in service, and dates on which tires, bearings, batteries and various parts were replaced. This gives information regarding the length of life of various paris and acts as a check, not only on the operator and garage, but on the makers of parts and factory as well.

As may have been gleaned from the "five weeks" card, the company closes its books once in five weeks. The dates considered in computing the cost figures herein, were taken from the card which began Jan. 29, 1912, and ended March 2. It will be remembered that the weather conditions during that period were not particularly favorable.

The records showed that during the period a total of 63.023 miles was covered by the 100 cars, with an average of 22 miles a day for each machine. The total power cost was \$597.63, or 19.9 cents a day, a vehicle, and an average of .9 cent a mile. The total accident expense was \$84,65, or 1.82 cents a vehicle a day, and an average of .083 cent a mile. The total repair cost, covering all items of expense In connection with the garage and the malitenance of the vehicles, was \$2400.50, or an average of 80 cents a day a car, and 3.63 cents a mile. The entire maintenance cost, exclusive of interest and depreciation, for the five weeks was \$3082.78, giving an average of \$1,027 a day a vehicle and 4.66 cents a mile.

G. M. C. ACCESSIBILITY AND SIMPLICITY.

According to C. L. Morgan, sales manager of the electric division of the General Motors Truck Company, the

new G. M. C. electric, designed by John Lansden has at least 1x important features, embodying the maximum of accessibility and simplicity. Some of these are outlined as follows: Rear springs outside of the frame to Insure maximum axle strength, permitting the use of a narrow frame and giving short turning radius. The steering post is inclined. Double brake equipment is provided, each brake locking at wheel. Auxiliary springs supplement the rear semi-elliptic members, and an apparatus or controller hood is placed in front of the dash.

This latter is designed somewhat along the lines of the so-called Renault hood for gasoline cars. The accompanying Illustrations bring Two Views of the New G out this exclusive feature. It will

he noted that the controller, safety switch, amperehour meter, lamp circuits, etc., are all instantly accessible by lifting this hood. It is maintained that this location means a great deal to the garage man, because the controller has been so placed that adjustment and inspection of each and every finger is made readily. The whole assembly is amply protected by a heavy oak bumper, substantially ironed.

Another feature is the location of the battery on top of the frame under the driver's seat. This has been decided upon as eliminating unnecessary labor and removing all possibility of accident by dropping of battery crates, or short circuiting due to hanging wires, etc. In addition, the battery is in plain sight, so that the caretaker does not have to work through a trap door or around corners to get at the cells. It is claimed that the battery is assured of the best possible care under this arrangement. The housing is properly ventilated, as well as being protected against excessive chilling, two factors which make for long life and the greatest efficiency possible,

COSTS OF OPERATION.

Summarizing the results of its 10 years' experience in the charging and operation of electric vehicles, the Commonwealth Edison Company of Chicago recently issued a set of cost figures which will prove of particular interest to those who are studying the problem of economical transportation. By reducing the average ton-mile costs to comparative terms, the experience of this company indicates that it costs more than 5.25 times as much to haul merchandise a given distance in a 700-pound wagon as it does to haul it in five ton loads. The following table ex-

plante the point.	
Vehicle capacity	Helative cost
in pounds	a ton-mlie
[10,4400	1,000
7,000	1.101
4,000	1.461
2,000	2.300
(,000)	1 454
700	5.272

Thus, if it cost, say \$500, to perform a certain haulage operation with five-ton electrics, this figure including all charges of maintenance and operation of the equipment, it would cost 2,309 times \$500, or \$1154.50, to do the same work with one-ton vehicles; 4.054 times \$500, or \$2027 to use 1000-pound wagons, and 5.272 times \$500, or \$2686, with 700-nound cars.

In computing these figures 24 miles were considered as an average day's run, with 300 working days in a year, giving 72,000 miles. The statement in detail, with respect to the five-ton vehicle is as follows:



3.	M, C, Electric, Showing Besign,	tecesalblill)	Morded	by Exclus	ive Hoos
	Cost for Fixed Ch	arges-	Almy	A Year	A Mile
	Amortization		\$1.50	\$150.00	10 06 *3
	Interest		. 63	135.00	.0158
	Fire insurance		15	65 90	0062
	Linbility Insurance.		22	100 00	0135
	Tetals		\$2.63	\$734.00	\$9,1014
	Beneval Charges-				
	Hatteries		\$1.12	\$125.00	\$0.0550
	Tires		2 106	615 30	HN59
	Chains		19	55.10	00×1
	Gears and sprockers		26	79,40	.0110
			1.6	43.16	4111-641
	All other parts		17	50 00	0.0065
	Totals .		\$4.21	\$1274.45	\$0.1769
	Garage Charges-				
	Electric nower		\$7.10	\$3.10.50	\$0.045.9
	Rent. fight and heat		3.5	164.85	H225
	Gurage labor		.77	232 00	0322
			-		
	Totals		\$2.42	\$176.33	\$0 1000
	bu per		\$2.50	\$150.00	\$0.1012
			\$11.59	\$1451.00	\$9.450.4

CONSTRUCTION OF LAMBERT ORCHARD TRACTOR.

BELEVING that there is a distinct field and increasing demand for a suitable motor voicible, wherever orchards are cultivated, the Buckey Manufacturing Company, or at least that portion of the roncern represented by J. W. Lambert, who invented the Lambert friction transmission utilized in the pleasure and commercial carses, and the constructed by H, has decided to produce a three-wheel constructed by H, has decided to produce a three-wheel constructed by M. Lambert has made arrangements to exect a factory on the Pacific Const, probably in or near Los Angeles, Cal., where these vehicles will be manufactured. It is understood that for the present this hranch of the business will be conducted as a separate institution, and that no pleasure cars or tracks will be built in this plant.

Three views of the new machine are presented herewith, and it will be noted that it presents several features not hitherto seen in tractors of a similar character. Of course, the rear wheels are the driving members, which the front is utilized for steering. The position of the driver, at the extreme rear, is such as 10 make it never the second of t is expected to work calls for ample traction with the driving wheels. In this respect the Lambert vehicle has much to commend it. It will be noted in the first place that all three wheels are fitted with a broad band of steel. On the rear members, the tire may be said to be in three sections. On the inside, next to the frame is a solid rubber tire, which is somewhat wider in diameter than the remainder of the wheel, so that it carries the weight of the vehicle when the tractor is traversing hard surfaces.

Next to this Is a continuation of the flat steel band, but with projecting clears, or pistes, while the projecting clears, or but with projecting clears, or pistes, while the soft ground and check the tendency of the wheel to slip. Outside of this there is a ring of plates, continuations of the projecting clears, but set at a slightly different angle, which work in the same manner and still further augment the tractive effort when needed. The clears, or plates, automatically clear themselves of earth.

As to the construction of the remainder of the rear wheels, it will be noted that the wheel itself is in two parts. That meaner the frame is in effect a broad steel



Side View of Lambert Orchard Tractor with Hood Removed, Showing Location of Power Plant, Prictian Transmission and Other Components, Alsa Construction of Road Wheels,

sary to carry the steering column, which by the way, is similar to that utilized in ordinary automobile construction, forward to a point nearly under the centre of the chassis, from which it is taken to the front wheel by the usual arrangement.

The requirements of an orehard tractor are such that as extremely low machine practically is a necessity. In plowing and working the soil it is desirable to drive underneath the trees and as close to these as may be necessary for properly cultivating the ground. Having this in mind, Mr. Lambert has designed a machine that is that 42 inches in height. This accounts, in a measure, for the placing of the driver at the rear. It also will be noted that the skeleton seat is extremely low, although at a sufficient height to permit the operator full view shade.

Another demand upon a machine designed for working in an orchard is that it shall be able to turn short, so that there may be no wanting of space at the ends of the rows of trees. This explains the three-wheeled construction, inasmuch as it will be admitted that a vehicle of this type is capable of making the shortest possible turns.

The very character of the surfaces over which the tractor

ring, from the Inner persphery of which short spokes lead to the central hub. The outside portion is composed entirely of strong steel spokes leading from the hub to the felice entrying the broad steel band. Inasmuch as these wheels are expected to support a major portion of the weight of the vehicle and its load, as well as to provide traction, this designs is recarded as extremely essential.

The front wheel is assembled about a very large buth, which is searchally two rings, the outer carrying the inner end of the spokes and forming a part of the wheel groper, and the inner remaining stationary, so far a rotation is and the inner remaining stationary, so far a rotation is the wheel urns in the wheel urns in stering, this crossing the diameter vertically. Strong sited spokes connect the outer ring with the broad steel band. This latter extends beyond the central solid rubber (if con either side, and comes into play when this stake into the soft earth.

It is obvious that in order to provide maximum efficiency under all conditions, an orchard tractor must be utilized for other purposes than working in the orchard. It must be available for bauting fruit to the packing houses in trailers, for instance. For such work, the cleats are eliminated, the rubber tire carrying the whole of the weight.

Because of the unlimited number of speeds available with the Lamberr patented friction transmission, it is maintained that the Lambert orchard tractor will prove especially destrubble. J. W. Lambert was one of the four pioneers engaged in the stationary are existe manufacture, and has continued in this business for infour 25 years. For 12 years he has been actively interested in the production of Lambert friction driven automobiles. This experience has led him to believe that his latest vehicle will be an unqualified success.

With this system of transmission, it is maintained that I will be possible to operate the tractor while plowing at from 1.5 to two miles an hour, haul loaded wagons to the packers at a speed of say six miles an hour, and return empty at from eight to 10. Such a variation of speeds is particularly desirable, and the use of the Lamberturansmission does away entirely with complicated mechanism.

It will prove of interest to note the construction of this transmission. On the rear end of the driving shaft is mounted the driving wheel, or friction disc. This wheel is of aluminum with one side utilled smooth and even, and tact with the driven wheel, and when the edge of the latter touches the fare of the former near the centre, the lowest speed is obtained. As the driven wheel edge is moved across the face of the driving wheel toward its periphery, the velocity of the former is increased until it revolves at the same speed as the latter, which is always at engine speed. Forward or reverse movement of the velticle is obtained according to which side of the face centre of the driving wheel the driven wheel may be applied.

With the orchard tractor, however, the drive is first forward to the frielion wheels, or discs, thence backed to the rear road wheels. As a result it is necessary to apply the edge of the driven dises to the face of the driven disc in exactly the opposite manner to that employed with the lambert pleasure cars and trucks.

The motor employed is rated at 40 horsepower. The house four cylinders are arranged vertically, and the whole power plant is mounted directly in front of the driver and over plant is mounted directly in front of the driver and over the rear wheels. The radiator, however, is supported on springs at the front, as in the usual construction. Ignition is a by means of a high-riendom magneto. It will be noted that every working part of the complete assembly is thoroughly enclosed to noted exit from dust and grit.



Lambert Orchard Tractor as Seen from the Front at Left; Rear View at Hight, Bringing But Additional Features of the Tire Formation,

with the other webbed to give strength and lightness. It is perfectly halanced and so designed that no matter where the pressure may be exerted with reference to the face, the load does not cause a special stress upon the journal in which the shaft end is mounted.

The wheel being coupled to the driving shaft, is moved backward or forward slightly to either clear or engage with the driven wheel, mounted on a cross shaft at one end of which is a sprocket. This driven wheel may be moved on the shaft crosswips of the chassis frame.

Normally, the position of the driven wheel may be assumed to be in the centre with reference to the face of the driving wheel. The periphery of the latter is normally just and clear of the face of the former, this position corresponding to to that generally termed as neutral with the conventional forms of xear transmission.

It will be remembered that the principle of the friction transmission is that based upon the fact that when the work of the principle of the property of the property of the directions. Therefore, when the driving wheel is forced backward, having reference now to the construction as opplied to the Lambert pleasure cars and trucks, into one It may be mentioned that the usefulness of the orchard tractor is by no means confined to that of plowing and working in the orchard, and to having wagons to the packling establishment. The design also admits of driving farm machinery, one of the disc shafts projecting through the frame, as shown in an accompanying illustration. This takes a belt pulley, which forms a part of the regular equipment of the machine.

Mr. Lambert and the Buckeye Manofacturing Company believe that in the Lambert orthard tractor they have an nil-sround machine which will prove invaluable to the fruit grower, and there seems to be no reason why it should not serve a useful purpose in other fields, particularly on the so-called small farm. The same features which make an appeal to the orchard man will prove decleded selling points in other lines.

The Chicago office of the General Vehicle Computy, Long Island City, N. V., maker of G. V. electrics, has been removed to the sixth floor of the Otis building, La. Salle and Madison streets, and will be in charge of W. W. Witherby, succeeding P. O. Chrysler, resigned.



AINTS·FOR·PROPER MAINTENANCE

A Department for the Owner, Driver and Repairman.



SELECTING FILES

The average operator in purchasing files for the tool kit does not examine these members except to note that the size he correct and that they are of the desired coarseness or fineness. In selecting, a file it should be baisneed on one finger midway of its length, and struck lightly with some hard body. If the tool be a good one it will ring almost like a tuning fork. The file should next be held nearly level with the eye, the light falling obliquely up its teeth, which should present a perfectly regular and even appearance viewed from either end. The color stoold be dull, silvery gray, free from spots or mottling, except at the end of tang.

Files should be kept in a rack in the garage and should not be thrown in a drawer among other tools. If one or two are carried in tool kit on the car, they should be

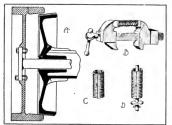


Fig. 1.—Some Garage Hints: A, Showing How Worn Clutch Bushing Causes Clutch in Drag, Creating Gear Changing Difficulties: B, Method of Compressing Valve Spring in Viac; C, Outlining How Spring is Tied; D, Depicting Its Replace-

wrapped separately in paper or cloth to prevent injury to their teeth.

The novice is apt to utilize the first file that comes handy, sawing hackward and forward, but he will soon discover that the tool cuts on the forward stroke only, and that if he relieves the pressure on the return movement he will husband his strength, and the teeth of the file also. In time he will husband his strength, and the teeth of the file also. In time he will buy 12-ind-files and be particular as to the use to which they are put. It is poor practize to employ a new file for work on solder. These members when new and fine should be reserved for brass and similar metals. To file well is quite an accomplishment as the novice will probably note after surveying his attempts to obtain a smooth and even surface.

SOME GEAR SHIFTING TROUBLES.

The operator of the modern commercial vehicle rarely estimated in the modern commercial vehicle rarely excher, as the manufacturer has overcome those troubles prevalent in the early types of pleasure cars. Many of the latter, however, have been converted over lots mechanical transports and in some lines of husiness appear to give good

It is not uncommon to note that some operators of these types in changing speeds cannot make the shift without the movements being attended with more or less grinding of the pinions, a noise disagreeable to the driver as well as the experienced motorist. This clashing of the pinions is not always the fault of the operator as an expert driver may have trouble in making a quiet shift when certain conditions exist as with a worn clutch husbing or when the design is such that the incritant of the flywheel is not overcome.

in order to effect a silent meshing the pinions to be engaged must rotate at approximately the same speed, and if one he turning faster than the other, the slower member must be brought up to the same number of revolutions as the other, or view versa. This is usually accomplished by decreasing or increasing, as the case may be, the speed of the motor which imparts energy to the female portion of the clutch and thence through the male member and shaft to the constant mesh gears of the transmission.

Worn Bushing.

If in withdrawing the male member it continues to spin it is obvious that the gears of the transmission will also rotate and that the messbing of philoss will be productive of a grinding noise as the gears are being messbe by force, especially in effecting a change from a high to a lower ratio. It is also possible that the continued movement of the malest the member may be due to its dragging, caused by a worn clutch bushing, such as outlined at Fig 1. A. It will be not clutch bushing, such as outlined at Fig 1. A. It will be not on the spindle, and that the periphery bears against the female member even when the clutch pedal is depressed to its fullest extent. The contact may be slight but enough friction will be set up to cause the female portion to impart motion to the come member.

These bushings are frequently overlooked in the matter of lubrication, resulting in the wear outlined. It is an end in the matter to test for dragging by throwing out the clutch with the motor running and noting if the male member come a complete stop. It continues to rotate, even though slow-ly, the hashing should be examined for nudue wear.

Clutch Stops.

If the design of the clutch he such that the inertia of the flywheel cannot be overcome through proper operation, it is poor practise to utilize the chamfered edges of the pinions as braking members to reduce their speed in gen

The inertla of the flywheel may be overcome, however,

by the fitting of a clutch stop or brake, its design depending upon that of the clutch. At Fig. 2 are presented several upon that of the clutch at Fig. 2 are presented several clutch and these may be constructed and fitted by the average driver. Their object is to retard partially or wholly the spinning of the clutch shad then dead to enable the operator to change up or down as the case may be without grinding the binlows in the episions.

The stop outlined at A is suitable to a car having a cross member upon which is mounted the device. It consists of a five-inch round metal rod which is threaded at one end, and fitted with a wooden block baving a leather facing at the other extremity. To the cross frame is holted a T piece and the latter is threaded to take the rod, which is held seurely by lock nuts. This arrangement permits for adjustment

Another form of clutch stop is presented at R. It consists of a piece of spring steet, one end of which is slotted to engage with the studs of the transmission casing, while the other is hent upward as shown in the sketch, and a piece of hard leather riveted to the end. This method is preferable where the design of the car will permit of its use, as it is made easily and by means of the slot can be est accurately. Being constructed of spring steel it will give more or less and will not be on harsh in its settion as the stop previously

REPLACING VALVE SPRINGS

In attempting the removal of the valves for grinding the novice is liable to experience more or less difficulty in overcoming the tension of the springs unless the valve litting tool be of an efficient design and particularly adapted to the type of motor. Although it usually is an easy task to remove the cotter or retaining key, the replacement of this member is troublesome, especially if the litting tool should

A simple method of replacing the springs is to compress these members in a vise as shown at Fig. 18, after which they are tied as indicated at C. The spring should be secured on three aides as outlined in the drawing and compressed just enough to clear the slot in the valve stem. It is then an easy matter to slip the spring over the stem, replacing the collar and retaining pin, as indicated at D, after which the cord is cut.

TIRE PUMP HINT.

One of the most exasperating features of changing shoes after a puncture is to discover that the pump leaks and that enough pressure cannot be secured to overcome that of the

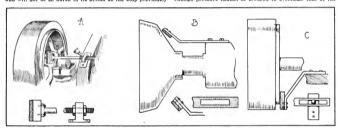


Fig. 2—Practical Clutch Stops Designed to Overcome Inertia of Flywbeet: A, Adjustable Rod Attached to Cross Frame Member; B, Steel Spring Bolted to Transmission Casing; C, Method of Fastening to Frame,

described and will be found to be equally efficient.

Where the design is such that it cannot be placed upon a cross member or on the gearbox, the sub-frame may be utilized, and at C is outlined a method of attaching the braking device. A platic is boited to the frame and the former drilled to take two boits, these being employed to lock the stop proper. The latter is constructed of spring steel and slotted to permit of adjustment for position as well as wear of the leather pad. In setting the device, the clutch is thrown out and the stop moved forward until it comes in contact with the periphery of the female member, when the boits can be locked ascurged.

Adjusting Stops,

In adjusting these devices it should be borne in minding that they should not be so set that a barsh suggement will follow. Their object is to slow down the spinning member follow. Their object is to slow down the spinning member of the threquired speed for meshing of certain pinions in the quire but a short time for the driver to learn the "feel" and operated will make changing up or down an easy matter and eliminate the undestrable grinding the order to be stopped or the stopped of the stopped

valve. The leak generally will be located in the connections, that utilized for attaching the tube to the valve stem being the chief offender. The trouble may be cured temporarily by taking a bandweerheler or strip of thin cloth and wrapping it snugly between the connection and the hone, making several turns. If the tire appears to pump hard, that is, considerable strength is required, remove connection and toosen valve stem. The latter should be readjusted and tested for possible leaks upon completing the inflation of the shoe. It is surprising to note the number of valves discarded as imperfect which simply require cleaning to be as efficient as ever. Dust or dirt may collect on the seat preventing proper action.

A LUBRICATOR DEVICE.

Some cars are fitted with an oiling system which lacideds a giass sight feed on the dash. These become stained beformed to the dash of the become the control of the control of the distribution to note at a giance whether or not the lubricant is dropping. Then again some are so not located that the light is poor. This may be overcome by placing a plece of mirror back of the member which enables one to see the drops of oil as far away as the lubricator is visible.

TREATING SULPHATED PLATES

When, on test, the efficiency of a storage battery sinks to 50 per cent, or lower, the plates should be removed and washed thoroughly with distilled water. They are then placed in a cell containing a two to five per cent, solution of caustic soda in water, and the charging current sent through in the usual way. If the sulphate on the positive plate should not disappear during the time of the ordinary charge, and the solution gives an acid reaction with litmus paper, more caustic soda must be added to the solution. and the charging continued until the plate bas the usual chocolate appearance. The plates should then be removed from the soda, well washed, replaced in the sulphurle acid solution, and the charging continued until gas begins to be given. Many ceils have their efficiency raised from 25 to 75 per cent, by six hours' charge, and many electricians believe that any plate which will hold together will repay treatment by this method.

INSTALLING DRY CELLS.

Careless instaliation of both dry cells and storage hatteries is responsible for difficulty in starting the motor when cold. The average driver does not give these members or the coll the attention that was formerly done, when the

DIRECTION OF CURRENT.

June 1912.

When charging storage hatteries and there is any doubt as to whether the current is alternating or direct, it can be ascertisated by approaching the lamp with the pole of a bar magnet. If the filament remain steady, it is direct. If on the contrary, the current be alternating, the solenoid will be disturbed and the filament will be alternately repetied and attracted, and set to vibrating rapidly.

NUT LOCKING KINK.

Para retained by a lock nut and subject to considerable vibration are liable to work loose. Sometimes it is not practical to utilize a lock washer. A simple method is to make a washer of stiff and heavy paper and if care be exercised in setting up the nut the latter will not work loose as the paper is a non-conductor of vibration.

MACHINING WORK SOUARE

It is considered a difficult task to machine a piece square in a lathe without a special attachment, but it can be done as follows where there is no other machine at hand: Champ a toolmaker's vise to the face plate and place the piece to be machined in it with enough projection to



Fig. 3-Mechanical Devices Applicable to the Repair Shap: A, Universal Adjustable Viar; B, Safety Lathe Dog) C, Ordinary Member; D, Surface Plate Utilized with Universal Visc.

magneto was not a part of the standard equipment. Dry cells being utilized for starting purposes only, are apt to be neglected, creating ignition troubles as well as the expense for new members, when a little attention would bave obviated the trouble.

When metal battery boxes are employed, and these not limited with wood or some insulating material, the relis should not be thrown into the container and merely connected; they should be packed tightly with waste or paper to prevent their jumbling about and care should be taken to see that the lid of the box does not come in contact with the terminals

Sometimes the storage haltery has to be removed for charging or repairs and its place taken by a set of dry cells. These should not be placed in a box where a storage battery has been used previously until the laterior of the container has been scrubbed thoroughly to remove all traces of acid, otherwise the zinc of the cells will be attacked and destroyed quickly. Instances are known where a number of dry cells have been destroyed within a few days by the acid left in the battery box in which a storage battery was used formerly. In washing the car care should be taken to prevent water from reaching the cells, for if these members become wet a loss of current is likely to ensue. The same will apply to containers which do not exclude the rain.

permit of facing off one side. Then place the finished side toward the fixed jaw and machine the next face, and so out until the work is completed. If care be taken in clamping, the job may be done to a surprising degree of accuracy and ha short time,

UNIVERSAL VISE AND SURFACE TABLE.

A vise having a universal adjustment which makes it possible to hold odd shaped as well as ordinary parts, is heing marketed by the Victor Vise Company, Springfield, O., and is presented at Fig. 3 A. in addition to a swirelling hase which provides for angular adjustment the vise-can be raised or lowered to any convenient helpt. It may also he rotated about the axis of its supporting column. These various adjustments permit the workman to obtain the hest light on lines or prick punch marks indicating finished surfaces, as well as eliminate stooping or awkward working positions.

A rigid position is secured easily by a single clamping lever, and when a vertical adjustment is made, the vise in automatically held until the lever is tightened by a locking collar on the stem. The device is made in four styles and a like number of sizes.

At C is shown an accessory to the vise and this surface or table can be mounted in the base as depicted. The plate may also be detached from the stem and utilized on the bench the same as an ordinary member. They are made to suit individual requirements.

SAFETY LATHE DOG.

The repairman familiar with the lathe realizes the danger connected with the utilization of the ordinary lathe dog with an unguarded set screw which tends to catch in the clothing. This is especially true when filing. Eimer J. Michaud, South Windham, Conn., has brought out a safety lathe dog which is so shaped that the machinist is protected. The tail of the dog is curved around in front of the set screw on the leading aide, this being located according to the direction of rotation. The tool is easily attached and replaced. The safety dog is illustrated at Fig. 3 B. and the ordinary member at C.

SPEED TABLE FOR TWIST DRILLS.

The speed and feed of high speed and carbon steel twist drills, when drilling mild steel, are important, and it is generally desirable to keep the cutting speed comparatively low, to avoid overheating of the drilling point, and consequent waste of power. E. G. Wrigley & Co., Birmingham, England, has compiled a diagram which was published recently in the Practical Engineer of London, and which is presented at Fig. 4. The values given are not experimental or test rates, but intended for every day practise. They may, however, be exceeded under favorable conditions.

CORRESPONDENCE.

MOTOR TRUCK cordisity invites the owner, driver, repair-MOTOR TRUE Consider the control of the control of the control of the mechanical transport in these columns, believing that the automobile industry and those closely allied with it will be benefited thereby. Complete information dealing with that he automobile industry and those closely albid with 1 will be benefited thereby. Complete information desiling with the construction, operation, minitercance and the receipt of a communication addressed to the effect of AMPSII THIS 'S. Suggestions of a mechanical nature, or facilitating regardly, and the complete of the companied by the full name and address of the sender, the formation purposes the name will not be needed to the complete of the complete of the complete of the companied by the full name and address of the sender, the companied of the conference of the companied of the destred

Storage Battery Plates.

(1)—I would like to be informed in regard to the Faurreype of storage battery plates as to whether the active marginal, olde of lead, applied in a paste form is the same for both the negative and positive plates and how the difference between these members may be distinguished.

Brooklyn, N. Y., May 6,

The active material is not the same. in the Faure or pasted cells lead plates are coated with minium or litharge made into a pasic with acidulated water. When dry these pistes are placed in a bath of diluted sulphuric acid and subjected to the action of an electrical current, by which the oxide on the positive plate is converted into peroxide and that on the negative reduced to finely divided or porous lead. The positive and negative can be detected easily by their color after formation, the former being a brown or chocolate, the latter a light gray.

Cause of Hinging Volue,

(2)-Am driving a Chase sir-cooled track and when oper-ating fast with the motor hot and laboring, the pistons seem 2)—An driving a trase introduced this constant fast with the motor hot and laboring, the pixtons green to ring, which I think would be unusual with a water-cooled engine. Can you tell me the probable cause of the noise?

P. E. FISHERT.

Wheeling, W. Va., May 10, The polse referred to is probably due to preignition caused by carbon in the cylinder, the material igniting the mixture and producing a metallic knock, a condition which could exist with the water-cooled motor as well. A loose connecting rod will create a similar noise. The cylinders should be examined for carbon deposits and these removed. If carbon collects easily it is due to an excess of oil. The instructions of the maker should be followed as to the lubricant and operating.

tase Hardening.

(3)—I noticed a reference made to case hardening in MO-TOR TRUCK. I presume it is a method of hardening metal. Will you explain how it is done and what effect it has upon the metal?

G. L. ANDERSON. Chicago, May 23.

When Iron or steel is heated to redness or above in contact with charcoal or other carbonsceous material, the carbon gradually penetrates the metal, converting it into high carbon steel. The depth of penetration and the percentage of carbon absorbed increase with the temperature and length of time allowed for the process. In the old cementa-

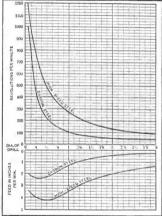


Fig. 4-Diagram of Catting Speeds and Feeds for Twist Drills. tion process for converting iron in "hijster steel" for remelting in crucibies, flat bars were packed with charcoal in an oven which was kept at a red heat for several days. In the Harvey process of hardening the surface of armor plate, the plate is covered with charcoal and heated in a furnace for a considerable time, then rapidly cooled by a spray of water

in case hardening, a very hard surface is given to articles of Iron or soft steel by covering them and packing in a box or oven with a material containing carbon, heating them to a redness while so covered, and then chilling them. Many different substances have been used for this nurpose. such as wood or bone charcoal, charred leather, sugar, cyanide of potassium, hichromate of potash, etc. Hydrocarbons, such as illuminating gas, and gasoline are also used. The general effect of hardening is a slight increase in bulk, which is reduced by tempering.

FEATURES OF NEW KELLY ONE-TON TRUCK.

EMBODYING constructional features making for simplicity, durability and accessibility, as well as for economy in maintenance, important factors in the mechanical transport, the new one-ton model announced by the Kelly Motor Truck Company, Springfield, O., is of particular interest, Inaumoch as this concern is a pioner in the commercial car industry its product enjoys an envisible reputation for consistency, both in contest and service, and its access is due to the bick grade material utilized and skillful workmanship employed.

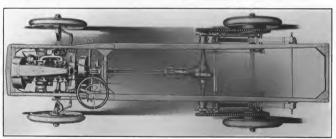
The components of the chassis are manufactured in the company's extensive plant and in the numerous operations involved the limit of error in production with a majority of parts is keld to, 0.01 of an inch while others are to an even fluor measurement, a system employed in the manufacture of high grade pleasure cars and one making for economy in upkeep of the vehicle. Interchangeability is a feature emphastized by the company, special ligas being a tutilized even for the drilling of cotter plin holes, and it is political out that when necessary to replace a worn part it will fit into place perfectly without any adjustment whatsoever.

The motor is located under the hood, the company main-

removing four nuts they may be taken out quickly, facilitating grinding when necessary. All are interchangeable. The intake members are located on the right and the brake manifold is of Y construction and of such design that each cylinder receives its proper and proportional amount of mixture. The exhaust members are on the left hand side, having a well designed and accessible manifold which reduces have increases.

The crankshaft is of a high grade steel, ground accurateby to size, and its bearings are of liberal dimensions. These are carefully adjusted and tested in the assembly of the motor. Particular attention has been paid to the design of the eams and imprest, those members being noiseless in their operation, as well as constructed of hardened material to resist wear. All timing gears are of a special grade of steel, cut by special machinery, and their mesh is such as to provide durability and quiet operation.

The crankease is divided, machined to a perfect ht, and the lower half containing the oil compariments, is provided with four drain plurs, facilitating the cleansing of the crankcase of all sediment desponded by the lubricant in service. The timing gears are readily accessible through the removal of a substantial and carefully fitted housing.



Plus View of Changle of Kelly Ope-Ton Truck, a Design Making for Simplicity and Accessibility,

taining that the average driver will give it more attention, than if it were placed otherwise, and that the design of the chassis is such that the load distribution is identical with that of the two and three-load models—78 per cent, on the rear wheels and 22 on the forward members. Experience has convinced the maker that such a distribution contributes to economy in the upkeep, and cites the performance of the winning three-lon Kelly truck in the Chicago-Detroit contest, in which cost of operation, maintenance and three were important factors.

The four cylinders of the four-cycle power plant are cast singly, having a 4.375-the hor and a 1.152-the k stroke, and although rated at 30 horsepower according to the 8. A. E. formula, will develop considerable in excess of this rating. A special bight grade, close grained gray iron is utilized and the cylinders, pletons and rings are machined accurately and ground carefully, insuring uniform compression and a perfectly balanced motor.

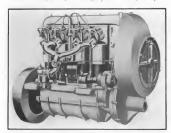
The rocker type of valve is employed, these members being of liberal size. The operating mechanism is sturdily constructed, and means are provided for lubrication and accurate adjustment. A feature is their accessibility. By

Ignition is by an Eisemann true high-tension magnetowhich automatellally advances or retards the spark according to the speed of the motor, obtaining maximum efficiency at all times. Lubrication of the main bearings is by forces feed gear driven older lorated on left hand side of the motor, the other working parts being cared for by the splash system. The oil tank is of ample capacity and provided with means for adjusting the flow of lubricant.

The cylinders are cooled by a centrifugal blower which is integral with the motor. This member is housed and being directly back of the cross member of the frame is protected from possible indjury. Alr is drawn into the housing hy the blower, which operates at crankfinkf speed and is actuated by a silent chain. It is then forced at a very high rate through an aiuminum pipe extending to and over the cylinders, passing down over these members, thoroughly cooling the exhaust valves as well as other components of the motor. It escapes at the bottom of the Jackets, as indicated in the phantom view illustration depicted herein. It is claimed that the fourth cylinder receives exactly the same amount of cooled air as the other members. That portion of the system attached to the cylinders is according to the cooled air as the other members.

moved easily, if desired, being retained by four wing nuts.

The motor is suspended by four substantial extensions of
the main frame, and by removing eight bolts the power plant



Diagonal View of the Power Plant, duttining Construction of Blower and Honning, the Cylinders Being Couled by Mr Forced at Very High Speed,

may be removed easily and quickly. The clutch is a specially designed ieather faced core, provided with surings beneath the frictional material, making for easy engagement, and is operated by the usual pedal. Perfect alignment is secured by a cross shaft and a centre cross member between which is located the goar shifting gate and control levers.

Drive from the clutch is through a double universal joint enclosed in a dustproof busing between the clutch and front end of the torque tube, this arrangement permitting the motor to be cranked easily with the car twisted out of line, as well as facilitating sbifting of gears. The propeller shaft is enclosed in a substantial torque tube, the front end of which is supported on the centre cross member of the frame by a yoke and slip joint. The driving shaft is of high grade nickel steel, 1.4375-inch diameter, having squared edis.

The jackshaft is of the semi-floating type and of the built-up design, making removal and replacement an easy matter, as by loosening a lock nut on either side of the differential the shaft can be withdrawn. The driving axies are made of sickel sized, 1.35-inch in diameter, with the differential ends squared. The driving ends are flanged and the sprockets are secured to these flanges by six boits, obviating keyways or square ends, also making for security. The sprockets on the rear wheels are also of the boite-duntype. Final drive is by side chalms these being 1.25-inch pitch with rollers, 35-inch diameter and width.

The transmission is what is known as the stacked type; that is, the countershaft is beneath the main shaft instead of beside it, and inspection is by means of a side plate, the latter being equipped with a filler plag as the currer oil level. It is claimed of this arrangement that it is impossible to linert more liabrican; than should be used. The transmission is of the selective type, providing three speeds forward and reverse. The shafts and gears are constructed of heat treated steel and rotate on high duty light bearings. The shafts are 1.1855-linch square and the face of the gears is from one to 1.5 inches. The deskin of the differential is such that either the top or lower half may be removed and replaced easily. The bousing is reinforced by ample webs.

The construction and adjustable features of the radius rod are unique, this being designed to withstand the severe stresses to which these members are subjected when the brakes are located on the rear wheels. The radius rod is

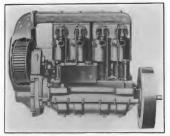
made in a single piece, the sprocket end being split and provided with a tongue and groove them bolted together. An adjusting hisek is fixed inside and on either side is provided with substantial adjusting boits. With this construction all of the braking strain is taken on a practically solid forging and the adjusting screws are subjected only to compressional stresses.

Particular attention has been paid to the brakes, these being two in number and both located on the rear wheels, the service being operated by pedal and emergency by lever at the right of the driver. The drums are 16 inches in diameter and two inches wide, and it is claimed by the maker that a fully loaded truck may be brought to an instant stop on an 18 per cent, grade with the vehi le moving at a rate of 20 miles an hour.

The frame is of very heavy pressed steel, clinning section, with cross members and corress reinforced by guesse plates. In addition to the front cross member is a substantial bumper affording protection to the power plant. Both front as or variation are from a section type, drop forgings with integral spring seats. The front axis section is 2.815 by two inches and rear, three by two. The spindles are of ample proportions, equipped with large size taper bearings. The adjustable cross rod is located in the rear of the front axis and the reach rod connections are substantial in construction.

Semi-elliptic springs are utilized both front and rear, the former being 49 inches long and 2.25 wide. The rear are 44 linches by 2.5. These are anchored securely to the main frame and equally well fastened to the stale. All parts subject to wear are provided with grease cups, these being readily accessible. The wheels are artillery type of carefully selected bickery, having 12 two-inch spokes, and both front and rear members are 56 linches in diameter, being equipped with solid, single tires 36 by 3.5 from and 36 by formantics, the bedge 38 by 3.5 from communities, the bedge 38 by 3.5 from and 25 from.

The steering gear is of the irreversible worm and gear type with 18-linch wheel upon which is mounted but one lever, that controlling the carburetor. To prevent overspeeding the motor is equipped with a ball type governor which can be set and scaled for any desired speed. The normal



Phanium Side View of Motor, Showing Course of Vir Through Viominum Pipe and Cylinder Jackets, the Former Belog Emily Detached by Menna of Four Wing Nots.

maximum speed recommended by the maker is 15 miles au hour. The fuel tank is located under the driver's seat having a capacity of 2st gallons, and the standard equipment includes three oil lamps, horn, kit of tools and Jack. Although rated at one-ton the chassis is designed for 1.5 one capacity and weighs 3.50 pounds. Throughout the Kelly Motor Truck Company has adhered to its policy of supplicity and few parts, making for accessibility, inherent features of its product.

A wide variety of bodies is manufactured to meet the requirements of all industries as well as for municipal service, the latter including fire apparatus, ambulance, patrol, etc. An ambulance body designed to fit the chassis described is presented in an accompanying illustration, and is of the panel type laminated wood with interior finished in natural wood and outside in white enamel. Windows are provided directly back of the driver's seat, also in the year door, and side panels and plate glass side shields add to the attractiveness of the design. The top is solid and the interior specifications include willow wicker stretcher with air mattresses, rubber slip cover, air pillow, medical chest and cane bottom folding seat extending full length of one side of the interior of the body. The body is eight feet 10 inches long inside measurement, 55 wide and five feet one inch high, with rear door opening of 45 inches.

The Kelly depot or 'hus body, also fitted to the one-ton chassle is another attractive design, accommodating 12

gerous, while those who stayed will not invest money in machines which may be confiscated or destroyed by the rebels. Due to the perils of war and the failing off in travel, the bus line between Jalisco, on the Pan-American Railway, and Tuxtla Guiterer has been discontinued after two years of successful operation. The line changed a hard three days' horesheck trip into a pleasant journey of 12 hours, and the service will be resumed when the country becomes quieter and travel safer.

DISPLACES MULES IN MINES.

Reports have come to the Eastern owners of the Jersey Nalicy Mincs Company, which operates silver and lead mines in Humbold county, Nev., of the economy which the use of a motor truck is making possible. The truck is employed to carry supplies, builting, etc., from the mine to the nearest railroad station, some 46 miles away, and makes the round trip of 92 miles in 15.5 hours, earrying 15 tons. The time going out loaded is 9.5 hours, while the return trip is made is seven hours, which is remarkable when the condition of the roads with their heavy grades on the mountain addes is considered.



Kelly One-Ton Truck: A, Side View of Channin B, Express Body; C, Type Utilized by Univoline Oil Company: D, Deput Wagon; E, Ambulance,

passengers, and the equipment throughout is in keeping with its rich appearance. The seats are hullt lengthwise of body. upholstered in hand huffed leather and provided with comfortable springs. The jazy-back extends the full length of the hody and is trimmed similarly. The interior is in natural wood and entrance is at the rear. The driver is also enclosed, a sijdeable partition separating him from the passengers. The windows are of the drop pattern fitted with bevel plate glass and equipped with eccentric fasteners. which lock them in any desired position and securely. Pullman type automatic roller curtains are standard equipment. The roof is of the English coach construction, fitted with rall for luggage and the interior of the body is lighted by three dome lights, the electric equipment providing also for pillar lamps. Solid tires are litted as standard equipment although pneumatics may be had, this being extra.

BAD TIME FOR CARS IN MEXICO.

The trouble in Mexico has upset the automobiling conditions considerably, for nearly all who had enough money to buy cars long ago left the territory which seems so danA 12-mule team was formerly used for the work, and took six days to make the anne Journey with a six-ton load, of which time three days were used on the loaded trip, one day to rest the mules, and two days for the return. Since the company purchased the truck it has discarded the mules not in this field and the machine is used for all low's where the roads are passable. It is stated that the truck can often eye where mules cannot, on account of the poor water supply. In that country mule drivers worry more about getting water for their mules than good roads, while the truck can carry enough water for long trips and go straight through without detours for water.

ECONOMICAL FOR HARDWARE FIRM.

A Detroit hardware firm that has been using a two ton G. M. C. truck for three months, watching its work closely, states that it is very well pleased with its economy, for it costs 50 per cent. less than the horses formerly used. It dows the work of three teams and covers from 20 to 30 miles daily, making from 55 to 100 stops.

TRUCK STANDARDS ADVISED.

The executive committee of the National Association of Automobile Manufactures held its regular monthly meeing May 1, when several recommendations made by the commercial whelle committee were adopted unanimously. The most interesting resolution had to do with the problem of motor truck demonstrations, and read as follows:

Resolved, that the executive committee recommends to all the members of the association that no member of the association shall demonstrate a commercial car or automobile which such member has for sale, to a prospective purchaser or customer, unless such member makes a charge and receives in payment for such demonstration the following prices only, to wit: One-half and one-ton trucks, 310 a day; two-ton, \$15; three-ton, \$20; four-ton, \$25; five and six-ton, \$30; seven and eight-ton, \$35; time and 10-ton, \$40.

Another resolution adopted deals with the width of the frame hack of the seat, and was proposed with a view to providing for future interchangeability of hodies on trucks of different makes. Two standard widths of frame hack of the driver's seat were adopted—35 and 42 inches—with frame lengths hack of seat as follows: Feez-four, size, six, seven, eight, nine, 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 14, 16, 16, 17, and 18. These frame dimensions, if generally

adhered to, will permit of stock bodies being huilt in quantity and delivered without delay, with the assurance that they will fit any make of truck.

The question of the threatened iegislation increasing the ilcense fees of motor trucks according to horsepower instead of load capacity, was considered, and a resolution was passed directing counsel to prepare a registration hill in which the fees shall he based on the factory rated load capacities at the rate of \$5 for trucks of one ton capacity with an increase of \$2.50 a ton for capacities above that up to \$10 for trucks of over 10 tons capacity. The hill is to be introduced in the Massachusetts and New York legislatures, and it

is hoped will be enacted and serve

The committee is to confer with the Society of Automolia. Engineers with his tokes of agreeing upon the lines slike which each organization shall proceed in recommendtion. The committee is the conference of the commentary of the committee of the commentary of the commentary of the recommendation of the commentary of the commentary of the station of mattery directly affecting the sale, use and comnates of tracks, while the S. A. E. has an its aphere the bringing about of uniformity of engineering practice in the design and construction of the chassis, covering also the rated load capacity.

The subject of frame heights is being considered, and it is expected that heights will be prescribed which will hear a relation to the heights of freight rar floors and express and iransfer platforms, in order to facilitate loading and unloadings. Statistics of the production and sale of notor trucks during the last year are being gathered, and it is expected will be complete in about a month.

NEW STORAGE BATTERY.

Announcement comes from Chicago that Carl E. Winters of that city has produced a new storage battery which is

much superior to former types. It is claimed that the new device will afford 35e cycles of charge and discharge as against 75 to 125 of the old batteries; that the plates are absolutely non-subjusting, with active material that will increase 35 per cell. in efficiency, maintaining this high state during a period of three years. It is claimed that there is no internal discharge or chemical action when the hatteries are not in use, and that the terminals are non-corrosive. The Perfection Storage Battery & Lighting Company has been formed for the manufacture of the hattery, and a large output is planned.

LIGHT VEHICLE MORE ECONOMICAL.

The Fuhrman & Schmidt Brewery Company, Shamokin, Penn, some time ago tested two trueks, one with a capacity of one ton, and a larger machine of seven tone capacity, with the Idea of trying out the two in order to see which would be the more economical. The test revealed that for the brewery the difference in relative cost was very marked while both did about the same amount of work. The small truck was handled by one man unassisted, who did all the loading and unloading, carrying 14 half-barreis to a load and unsking 14 trips in seven hours. The larger truck required the services of two men all the time, with another



Uppard-Stewart Truck with Express Body Built Especially for a Baltimore Ice Uream Company,

to assist in loading and unloading. If made three trips in the same time that the small machine was making 14, and carried only one more barrel in the seven hours than the light weight. Besides needing two more men than the small truck, the seven-ion machine cost more to operate, the gascline and oil bill being greater, with thre wear, depreciation, and interest on investment also amounting to a larger fixure, so that for this particular firm the smaller truck was the more economical.

LIPPARD-STEWART FOR ICE CREAM,

The Lippard-Stewart Motor Car Company, Buffalo, N. Y., has sold a number of its delivery wagons recently to be cream companies. The latest purchase by a firm of this character was by the Hoeffer for Cream Company of Buffalo, which bought five enclosed panel body wagons for its retail delivery system. The Maryland lee Cream & Fruit Products Company of Bultimore, Md., is another recent customer, having purchased a finely finished express body which was built especially for the firm. It is pulnted in cream and brown, making a deedledly near a paperance.

RECENT MOTOR VEHICLE PATENTS

Domizi Piston Ring Chuck,

A chuck for platon rings has been patented by David P. Domiti, Prankin, Penn, consisting of a body adapted to be attached to the live spindle of a machine tool, and having a clamping face perpendicular to the axis of said spindle, also means for centring the ring and for securing same. The device also consists of a longitudinally movable clamping rod having a head comprising laterally profetcing lugs, and a clamping plate adapted to be engaged by said rod head.

Lewis Muffler.

The elimination of noise and back pressure is a desiable feature in a muffer and numerous designs are presenced by the inventors. Edward Dudley Lewis, Elmira, N. Y., has patented a muffer comprising six semistiobular inter-communicating hollow sections, each containing a vertical baffle piate member, so designed as to deflect the gases through openings thereit. The partition plates and hollow

Bowen Grease Cup.

It has become standard practise to fit grease cups to all components of the chasis not lubricated by the oilling system. These cups are more or less exposed to dirt which clogs their threads making it difficult to turn down the clogs their threads making it difficult to turn down the granted a patent for a grease cup which presents many practical features, inasmuch as the working parts are prosected from foreign elements. The device is similar in a shape to the usual members, but is fitted with a rotating, the content of the

Berliner Speed Alarm.

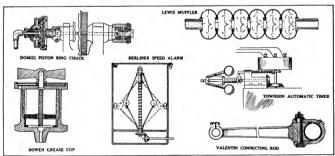
The overspeeding of commercial vehicles is one of the evils which the owner and maker is seeking to overcome. A device which rings a bell when a predetermined speed is reached, has been patented by Rudolph Berliner, Daniel Swem and Henry F. Moore, Chicago, It is on the centrifugal governor principle, a pair of arms carrying balls which come in contact with bells when the vehicle attains a certain speed. The device is gear driven from the power plant.

Townson Automatic Timer.

To secure the greatest efficiency from an internal combustion motor utiliting a variable ignition system the advance or retard of the spark must be varied according to conditions, the proper operation being acquired by experience. Thomas Townson, Philadelphia, has patented a device which is claimed to control automatically the time spark by actuating the time spark by actuating the time spark by actuating the time from the time shaft of the encine and supported by a brack-ct. The first anmed shaft is fitted with a movable affect or which is attached two weighted pivotally mounted arms. Increaser the ball members a cutate the affects which in turn moves the timer, advancing the spark. A decrease of engine speed in provided for similarly.

Valentine Bearing Adjuster.

Robert D. Valentine and Henry S. Battee, Minneapolis, Minns, ansignors to the Imperial Machinery Company of that city, have been granted a patent for a bearing adjusting device for connecting reds of internal combustion motors. It is a bearing with separately movable members, one embracing the other, a rotating occurrite best testending through both and a gib having freedom for lateral movement interposed between the bolt and one of the members. Eccurite comes are fitted to the bolt, and these engage with sockets of one of the morable members. Means are provided for rotating and locking the bolt, the former movement actuating the movable member for adlisament of the bearing.



Depicting Some of the Latest Ideas of Inventors of Devices Applicable to the Commercial Vehicle,

FIRE DEPARTMENT NOTES

AMERICAN-LaFRANCE PUMPING ENGINE.

Presented herewith is the new six-ylinder combination pumping engine, chemical engine and hose wagon, manufactured by the American-LaFrance Fire Engine Company, Elmira, N. Y. The equipment includes everything necessary for the average fire department. The puniping endine, which is operated by the same motor as the which propose the vehicle, is capable of throwing 700 gallons of water a minute. The degallon chemical tank supplies 200 feet of chemical hose, and the body is arranged so as to carry this and 1200 feet of 2.5-inch regular Tyre hose in addition.

The car is built entirely in the shops of the company, and is designed and constructed especially for heavy service. Particular attention has been paid to matters of refinement and simplicity essential in producing a successful chassis, capable of withstanding the severe stresses of hard work. The material and labor entering into the assembly are of the finest, and in its mechanical features the machine combines the best points known to motor car builders, and is ladd to anticipate future developments.

The motor is a six-yilinder, four-cycle, water-cooled unit, with 5-5-inch bore and six-inch stroke, developing 7.2.6 horsepower under the S. A. E. ratinz. However, as this formula assumes a piston travel of 1000 feet a minute it is claimed that it is possible for the motor to develop an actual horsepower of 95 under brake test.

Cylinders are cast in pairs of the very finest specially income when the selected gray from, with offset inliet and exhaust valves on opposite sides. They are hored and ground, as are the paisons and rings, insuring perfect compression. The water passages are integral with the cylinder existing and are taken on the chaust aide and discharged from the top over the combustion chamber. In the control of the cylinder cylinders growth of the cylinders provide a large space and form an equilet to the radiator.

The crankcase is an aluminum casting, made entirely as a unit and provided with numerous ribs, giving added strength without excess weight. It is designed to rest directly upon and be boiled to the main frame, doing away entirely with sub-frames. This casting is machined throusicut from templates and ligs, giving perfect alignment and interchangeability. The bottom half, or oil pan, may readily be removed for inspection of the main bearings and connecting rods, and is arranged with semi-circular channels to catch any dirt of rofeign matter. Each channel is provided with a drain plug, for the withdrawal of old lubricant. An oil tight extension of the craikeess forms a housing for the timing gears, this arrangement giving quiet running, good lubrication and very little wear.

The cist from pistons are machined and ground to gauge, and grooved to take four cast from piston rians. These latter are ground to the diameter of the cylinder bore and to the width of the grooves. The piston pins are of bollow steel, hardened and ground, and are held in piste by a locking belt. The length of the piston pin bearings is 2.5 Inches and the diameter 1.25 linches.

The crankshaft is machined from a solid billet of nickel steel, heat tracted, and all bearings are accurately ground to size. The crankshaft and connecting rod bearings are of special bearing metal, and are large in size to afford ample bearing surface. These are four in number, those at the front and rear being four inches in lenuth and those in the centre 3.25. All bearings are provided with oil grooves, insuring constant lubrication. All dimensions of this shaft, except bearings, are required to check within, 60t Inch, over or under; bearings to be round and true to size within one-quarter of that allowance.

Connecting rods of drop forged is section, special heat treated steel, are machined in Jias and fixtures. The cap is drop forged integral with the rod. The ends are drilled, reamed in Jigs and the cap then milled from the connecting rod in a special fixture, which proteits for absolute interchangeability. Shims are used in drawing up the cap to a perfect bearing.

The valves have cast fron heads welded to steel stems. They are turned and accurately ground to the same size,



Six-Cylinder Combination Pumping Engine, Chemical Engine and Hose Wagon, Produced by the American-LaFrance Fire Engine Company, Elmica, N. V.

and lapped into taper valve seats. The lifter guides are discases of ababilities are discussed and are discussed as a sea of seet, turned, hardened and ground. The design of the valve lifters with lower provision for adjustment by means of a set seree with the lower provision. The provision of the provision of a set seree when the provision of the lower and the

The latter is machined from the solid har with integral cams, hardened and ground to absolute accuracy. The timing gears are drop forged of special steel, have a face width of 1.5 inches, and the teeth are of a fine pitch. The gears driving the magneto and water pump are located on opposite sides of the motor, meshing with the timing gears. These are carried on like shafts, supported on two widely spaced annular bail bearings. All gears are enclosed in an oil tight extension of the crankcase.

For powerful motors running under high compression, a compression relief is held to be necessary for starting. This is accomplished by shifting the exhaust camshaft slightly forward, and bringing into contact with the exhaust valve lifters a toe ground integral with the camshaft, which lifts each valve during the compression period of its respec-



Interior of White Combination Car, Showing Acrangement of Seats, Hose Compartments, Etc.

tive cylinder, thus opening the valve and allowing some of the mixture to escape. The shifting is done by a lever, and after the motor is started the compression may be thrown in again immediately.

The carburetor is of the float feed type, with automatic auxiliary air latake, water lacketed. The gasoline tank has a capacity of 28 gallons, and is located underneath the body at the rear of the chassis. Ignition is by Bosch high-tension magneto dual system.

Two oil tanks, each of one gallon capacity, are located between the cylinders and supply a mechanical oiler, with sight feeds and feed regulator mounted on the dash. The labrication system is a combination of the gear driven pump and constant level spiash. The radiator is mounted on the main frame by a ball and truntion support. An aluminum fan, driven by belt arranged with belt tightener, is mounted on annular hall bearings at the forward end of the cylinders just back of the radiator. Another fan is located in the moort flywheel.

The clutch is of the multiple disc type, entirely enclosed and running in oil. It consists of 21 bronze and

steel, wedge shaped, circumferentially grooved plates, 11 Inches in diameter. Between the ciutch and transmission driving shaft is a shaft made of chrome nickel steel, arranged with universal joints.

The transmission is of the selective sliding gear type, afrording three speeds forward and reverse, direct drive on the high. The range is from one to 50 miles an hour. The years, shafts and pilions are all made of chrome nickel sixel, case hardseed, and the shafts are mounted on F. & S. annular ball bearings. The sliding gears are broached and faive a sliding fit on the bevel gear driving shaft, which is splined in a thread milling machine, hardened and ground. An interlock is provided for the shifting roots which makes it impossible to move one sliding gear when the other is not in a nearth position.

The transmission case is cast in a single piece, housing both the transmission and differential. The jacksbatts are squared to take the differential bevels and are supported on F. & S. hall bearings. Final drive is by double side chains.

Two sets of brakes are provided, both acting on the rear wheel hubs. Syrings are semi-elliplic front and rear. Wheels are of the artillery type, fitted with 38 by 4,5-inch custion tires, single in front and dual in rear. The axies are drop forged i section, Krupp chrome nickel steel, with no welds, specially designed for sorvice. Timken roller bearings are employed in all wheels. The side and cross frame members are of chrome nickel steel. The wheelbase is 18,6,75 inches, the tread 62 in front and 70.75 in rear.

WHITE FIRE WAGON SUCCESSFUL.

Accompanying Illustrations present two views of the combination, chemical engine and hose wano delivered by the White Company, Cleveland, O., to the Young America Hose Company of Poughkeepie, N. Y., in November, 1911. The equipment is fitted to a regulation White chassis and includes everything required for the proper fighting of Gires, the main idea being to stop the blaze before it has reached definite proportions. The Poughkeepise company nanwers every alarm in the city, and writes that it has never experienced any trouble whatsoever.

In every respect the machine has surpassed all sections of the guarantee given by the White Company when it was purchased. It climbs the hills of the city with ease, and as for speed, it has developed as high as 5.5 miles an hour on the long runs into the suburbs. Although some of the strets in these outlying districts were in decidedly poor condition, the mud often being hub deep during the spring months, the White fire waxpon travelled over them easily.

The Item of expense always is of interest, and President Lewis A. Thomson of the Young America Hose Company says the total cost of maintenance for the first five months was exactly \$1.49

WEBB WORKS LONG HOURS.

The Webh Motor Fire Auparatus Company, St. Louis, Mo., elaims a record for one of its Webb moor pumping engines, which recently worked continuously in Akron, O., for \$1.5 hours. The water was lifted from \$12\$ to 16 feet, and it is estimated that the pump delivered a stream averaging 500 gallons a minute throughout the entire period. The fouling of two spark pluga was the only apparent wear upon the apparatus, and even this was not discovered until the service was completed and the engine was subjected to a minute inspection at headquarters. With one exception, the longest run accomplished by a steam fire engine was \$123 hours, this exception being the flooding of the coal docks at Superior, Wils, in which the engine worked \$2.00.

hours. In the case of the steam engine pure water was supplied, while with the Webb, the pumping was with city sewage.

MOTORS FOR COLUMBUS, OHIO.

After considering the matter from every viewpoint the city council of Columbus, 0, has decided to adopt the recommendation of Chief Lauer for the complete motorization of the department. Chief Lauer conducted a systematic sampaign for his proposition, making several speeches before the council, calling particular attention to the increase of territory occasioned by recent annexation and the necessity for more adequate fire protection. He maintained that the utilization of motor equipment would prove not only the best but the chaepest, all things being considered. An ordinance has been passed, authoriting a bond issue of \$30,000 with which to make the required purchases.

BIG REDUCTION IN FIRE LOSS.

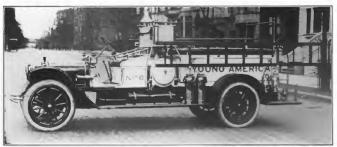
Manufacturers of motor driven fire apparatus are prone to lose sight of one feature, which proves an excel-

fight a serious blaze in the plant of the Rockford Desk Company, where it pumped water for 17 hours, a greater portion of the time with the thermometer registering 10 below zero.

As a further indication of the possibilities of the engine, a recent official test aboved that it was canable of throwing 7-60 gallons of water a minute at a pressure of 1st pounds of 1st prossure of 1st pounds through two lines of hose fitted with 1.125-inch nozzie. Eight hundred and thirty gallons a minute were pumped at a pressure of 33 pounds with a 1.25-inch nozzie with pressure was 130 pounds and the nozzie the pressure was 130 pounds and the nozzie the pressure was 130 pounds and 800 gallons, with a 1.35-inch, 73 pounds and 800 gallons, and with two-inch, 25 pounds and 800 gallons, and with two-inch, 25 pounds and 800 gallons, and

SPECIAL INSTRUCTION CHASSIS.

The fire department in Lynn, Mass, has been unaking auch rapid stides in the matter of securing automobile equipment, that it is a foregone conclusion that all of the apparatus will be propelled by motor within a short time. Taking this situation into consideration Chief Thomas A.



Combination Chemical and Hose Wagon Installed on White Chassis, in Service with Young America Hose Company, Poughkeepsle, N. V.

lent selling argument with city officials who are considering the advisability of replacing horses in this work. The factors of economy in maintenance and operation, as well as the saving in land and buildings devoted to fire service, are important, but there is still another view of the matter, as indicated by the following statement of conditions in Tacoma, Wash:

The fire loss in that city during 1911 was \$151,100, as compared with \$45,600 in 1910. Those interested in the modern motor equipment installed in Tarona, claim that the decrease is almost entirely due to the use of the automobile. The department now has aine machines, which enable the firemen to reach the scene of a fire much quicker than with horses, thereby making it possible to begin fighting the blaze before it has had time to become serious.

SEVERE TEST FOR AHRENS-FOX.

Rockford, Ill., is decidedly enthusiastic concerning the Ahrens-Fox pumping engine delivered to it by the Ahrens-Fox Fire Engine Company, Cincinnati, O., last January. Soon after it was placed in service, it was called upon to Harris has purchased of the Thomas Motor Car Company of Boston a special chansis, which will be utilized by members of the department in learning now to operate and keep in repair the various matchines placed at their disposal. In addition to its usefulness as a vehicle for instruction, a body will be fitted suitable for carrying coal to the various fire stations, etc.

IN THE MARKET.

The following cities and towns are interested in the purchase of motor fire equipment: San Jose, Cal., bids are asked; Stoughton, Mass., combey being raised; Winehester. Mass., combination hose and chemical; Newark, N. J., appropriation of \$27,000; Albany, N. Y., underwriters recommend three combination vehicles and cars for chefes; liuffalo, will equip new house; Braintree, Mass., pumping engine; Temple, Tex., two pieces; Des Moires, In, possible bond lessue of \$75,000; Pasadena, Cal., would replace horses; Hamden, Conn., combination hose and chemical; Ractine, Whs., two or three pieces; Auburn, N. Y., apparatus not in excess of \$22,000; Wasserly, N. Y., their recommends monor equipment.

FOREIGN TRUCK NOTES OF INTEREST

THE FOUR-TON HALLFORD.

Accessibility and ease of adjustment, combined with extreme simplicity and low maintenance cost, are the im-

manship, and particular stress is laid upon the fact that in the design and construction throughout, efficiency has been considered as of greater importance than first cost. The motor is a four-cylinder unit, rated at 32 horsepower under the R. A. C. formula,

and the extreme simplicity and accessibility of the various parts are clearly demonstrated in the accompanying illustration. The carburetor, for instance, is detached by merely loosening the nuts on the top flanges. The hightension Bosch magneto is held in position by a brass strap and wing nut, and it is claimed that replacement and renewal can be accomplished in one minute's time. The timing gear, oil bypass, oil filler, etc., also are so placed as to be accessible immediately when adjustment or cleaning is necessarv.

The crankcase is of aiuminum, injet and exhaust valvea are made from nickel steel, and are strictly interchance-

and are strictly interchangeable. Timing gears are entirely enclosed in the oil chamber, the lubrication system being the constant level splash. Ample provision is made for cooling, the system compriing a large radiator and fan, the circulation of water being maintained by pump. What is claimed as an exclusive feature with the radiator is the provision for the removal of the side tanks, exposing the tubes and rendering them alsolutely accessible for cleaning. This is held to he particularly accessary where hard water is used constantly, and the maker has found it advisable to take this situation into consideration. The lood lifts from the front, exposing

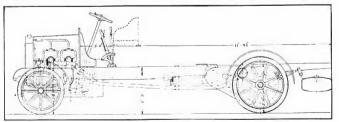
all parts of the englie to view for repair or adjustment. The clutch is of special design, a lesther faced cone member, giving ample surface. The transmission is of the silding gear type, affording three or four speech forward, according to the desires of the purchaser, and reverse. Control is by one lever on the gate principle. The gears are of nickel steel, of high tensile strength, and the desire of



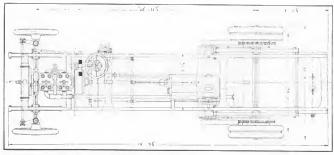
Sliding Transmission Employed in Four-Ton Hallford Truck of English Design,

portant factors entering into the design of the Hallford vehicles, manufactured by J. & E. Hall, Ltd., Dariford, Kent, Zaglada, and shown herewith in the four-ton size. This concern was established in 1755, and has a reputation in engineering work which is well known throughout the British 'appire. It has been engaged in the manufacture of commercial noton vehicles for a number of years, and commercial noton vehicles for a number of years, and commercial noton vehicles for a number of years, and Automobile Club's trials of September and October, 1997, In which nearly 60 cars of all classes competed, its product received higher awards than any other competitor in any

Every part of the chassis is made strictly on the firm's interchangeable jig system, making for beneficial results whenever it is found necessary to order spare parts or renewals. All parts are made in the company's own works including the motor, gears, radiator, etc., insuring an absolute guarantee with respect to both materials and works.



Side Elevation of Baliford Four-Ten Chassis, Indicating Principal Dimensions and Arrangement of Components,



Plan View of Haliford Four-Ton Chassis, Showing Extreme Simplicity of Design and the Effort to Bring About Accessibility,

the teeth is held to be such that they slide into and out of mesh with the greatest ease. All shafts are carried on ball bearings, and double thrust bearings are fitted in three places. All gears are run under load for 12 hours before being assembled in the chassis, to insure quiet and smooth running. The speeds permitted are from three to 18 miles an hour, according to the special requirements of the customer. Final drive is by side chain.

Two sets of brakes are fitted, the first acting on a drum on the gear shaft, the second operating on inside drams in the hubs of the rear road wheels. The frame is of special Hattford design, of pressed nickel steel. Springs are long and of great resiliency. Control levers are of mild steel forged from the solid, all joints being protected from dust. Both axles are of Kirkstall 40-ton steel, and the wheels are cast steel throughout, running on ball or roller bearings. The principal dimensions of the chassis are shown on the accompanying sketches,

The maker of the Haitford vehicles pays particular attention to the matter of body requirements, fitting those especially designed for all types of work. Among what may be regarded as standard bodies are the plain platform. stake platform with chains, lum-

ber, contractor, brewery and high sided express. Several machines with special equipment have been shipped to the various British colonies and other foreign countries, where they have given uniform satisfaction under ali conditions.

inasmuch as this concern has been engaged in the production of commercial motor vehicles for many years and has had abundant opportunity to learn the comparative costs between the operation of horses and Hallford trucks, it will prove of interest to examine some of the results obtained. The accompanying tables of the annual cost of conveying goods a distance of 20 miles daily is based upon the assumption that it would take eight horses to do the work

of one four-ton truck, which is borne out by the experience of concerns utilizing Hailford vehicles. The comparative figures, with totals carried out in American money, follow:

Annual Cost with Horses

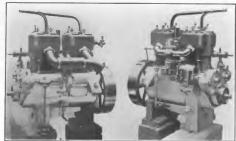
Four teamsters at 28s a week, 50 weeks	\$1362 62
Food and bedding for eight horses at (40 a year	
Shoring at 13 a year	116 AB
Veterinary at f1 10s a horse.	58.40
Rent account, 7s 6d a week.	379 3×
Depreciation, 15% on equipment, f61s,	167.18
Maintenance, 10% on wagons, 450	57,33
Interest, SC, on 6610	100 71

\$4154.92

Annual Cost of Four-Ton Truck Driver at 35s a week, 50 weeks. Gasoline at 5d a gallon, seven miles to gallon. Lubricanta

Lubricants
Tire depreciation at 2d a mile Depreciation on chassis, 1: Maintenance at f15 a year insurance at f15 a year Total for truck . . . \$2133.44

Balance in favor of truck \$:061.08



Both Sides of the Hallford 32 Horsepower Motor, Presenting Location of Fittings,

BELSIZE IN MAIL SERVICE

The long anticliated motor mail service between Mancherr and Hirmingkann in England has been inaucurated with three Beisse cars, made by the Belsize Motors, Lid. Clayton, Manchester. The postoffice authorities have entered into a three years' contract with the Auto Van Maintenance Company of Manchester, to run this road service, and figures have been obtained which proce conclusively that it will be far more economical than the older methods emblored heretofore.

The type of vehicle utilized is shown herewith, this leing the regular 28 horse-power, four-yilinder, three-ton
chassis, fitted with a handsome and commodious red mill
van body. Entrance to the rear is by means of a flight of
steps, which automatically folds up when the doors are
closed. These latter are locked and unlocked either from
the inside or outside, as occasion demands. Inside the van
is a guard's folding seat and hooks for mail bags, racks,
and all conveniences for handling the mail or route. Twin
Pollack solid tires are fitted to the rear wheels and single
in front. The motor is located in front under a hood.

thousands along the coast. The present demand is largely for trucks of four and five tons capacity, which must be constructed for travel over rough roads.

WANT FIRE APPARATUS IN BRAZIL.

The minister of justice and home affairs in Rio de Janeiro, Brazil, is interested in the purchase of a motor fire engine and other equipment of the same nature, it would appear that American manufacturers have an excelent opportunity to fill this order, particularly as other vehicles made here have been doing good service in that country

GERMAN FARMERS AIDED.

In order to provide more suitable facilities for the farmers of Germany to deliver their produce to market, as motor line is to be established between Heldenheim and Geislingen, Wurremberg. This will cover a distance of some 20 miles, serving no less than 10 villages. A similar service was Inaugurated between Weishelm and Troste



Two of the Beisige Motor Vans Recently Placed in Service for Mail Delivery between Manchester and Birmingham, Eng.

The vehicles will run twice a day between Manchester and Birminghain, by way of Stockport, Macclesfield, Congleton and Stafford, and meet and pass each other between Stone and Stafford. Eight and one-half hours is allowed for the distance on each journey.

BERLIN 'BUSES PAY WELL.

The Berlin General Omnibus Company, Berlin, Germany, reports an annual dividend of seven per cent, on the r-sults for 1911, as compared with six per cent, the previous year. In their report the directors stated that the increase was due largely to the extension of the service so as to include a decidedly additional traffic.

WEATHER AIDS IN SOUTH AFRICA.

In view of the fact that the farmers and business men in South Africa have shown a disposition to purchase commercial motor vehicles in large numbers, it is interesting to more that the condition of the weather has been such for some time past that the tree losen are dying by the February, 1911, but as yet has been operating at a loss. The promoters have asked the governments of Hesse and Baden for pecuniary support. It is understood that the vehicles utilized on this line were heavily overloaded during the busy eason, necessitating a large bill for repairs.

SUBVENTION AWARDS ANNOUNCED.

The German war office has awarded subvention placques to 12 webtless as follows: Daimler-Marierfelde, 16; Bussing, 16; N. A. G., 16; Benz-Gaggenau, 16; Durkoop, nine; Eisenach Motr Works, nine; Nanka, nine; Mulka, nine; Manka, nine; Mulka, nine; Manka, five; Bribardt, five; Podeus, five; German Industrial Works, five.

STREET CLEANING IN PARIS.

After making exhaustive tests of the vehicles available for the purpose the city of Paris has ordered 46 motor sweepers from the makers of Renault and Latty anachines, and nine water wagons from the producers of Latty and D Dion-Boston cars. In the combined sweeper and sprinkler class no markine was found entirely satisfactory and no orders will be placed as a result. The test machines were all purchased outright and will remain in service, in addition to the fleet mentioned.

IN RICE FIELDS OF SIAM.

Dr. H. Adamson of Slam is credited with being the pioneer in the use of motors in the cultivation of rice, and reports that the machines not only canbied bim to sow the crop much carlier and reap it before the grain of the native grower was ripe, but at a cost approximately half that of the older methods in vogue.

LONDON'S ANNUAL PARADE.

The sixth annual parade of motor trucks in London, England, was held May 27, no less than 308 machines being entered. As has been true in the past this event was patronized by King George V, and was under the auspices of the Commercial Motor Levré Association.

PIERCE-ARROW IN HONOLULU.

What is said to be the first motor truck in Honolulu, Hawsii, is the Pierce-Arrow five-ton worm driven machine

recently nurchased by the Oahu lce & Electric Company to haul ice. The body, designed by the l'lerce-Arrow factory, has several unlawe features. The floor and the sides to a height of 24 inches are covered with heavy zinc plate, thus forming a tank to cutch the water from the melting ice and preventing it from dripping down onto the chassis. The tank is drained at the front, and the zinc plates are protected from latury by the heavy ice by means of wooden gratings. While the weather in Hawaii is supposed to consist of pleasant sunshine. provision has been made in the truck for an occasional rain storm

or hot spell, the top extending over the rear and protecting the men while at work weighing the ice. The body is large enough to hold 36 cakes of ice of standard size.

NEW MARKET IN SOUTHERN AUSTRALIA.

The Velorian Storekeepers' Association of Melbourne, Anstralla, is decidedly listerseed in the subject of the mechanical transport, and has before it a proposition to purchase a number of vehicles for the transportation and delivery of merchandles. This organization is supported by the country trade, and all important firms in the state are connected with it. The secretary, George Jones, Melbourne, is anxious to revelve catalogues, trade information and any jetticed matter descriptive of machines suitable for service in that commonwealth. It may be well to add that there is a distinct demand for ears capable of transferring goods found glatances to branch offices.

FIRE WAGONS IN SINGAPORE.

The municipality of Singapore, in the Mainy nearinsular, has ordered its fifth motor fire vehicle, and is claimed to be the first city in the Far East to have a fire department, completely motor equipped. The new car is fitted with a

55 borspewer entire and steel result of a distinct problem. This latter innovabor is add to have been the result of a distinct problem. When the same of a distinct problem which has arisen with the use of wood. The humblity of the atmosphere is held to be the cause of the trouble of the trouble of the trouble within four months.

BIG 'BUS FOR MINNESOTA.

A big 27-juasemer bus has been built by the H. E. Wilton Motor Car Company, Mineapoils, Mine, for service by the Warner Company on the Iron range in Minnesota. The bus will run between Virginia and Biwabls, and If the service proves successful other marblines will be purchased for suburban routes around Minneapoils.

G. M. C. FOR LUMBER FIRM.

A lumber firm in St. Louis, Mo., is now using five G. M. C. trucks Instead of 20 horses, one vehicle having a capacity of 2.5 tons while the others carry five tons each. The first truck was bought two years are and proved such a success that the firm has now displared in horses entirely by motors. When the horses were soid, a few of the war-ons were retained, and are now used about the lumber yard as "dead" wagnon for making up the loads. Lumber



Pierce-Arron Worm Driven Truck Purchased by a Honolain tee Company,

is loaded on one of these while the motors are out on the road, and transferred without delay to them when they return, saving the time which would otherwise be consumed in loading the motor trucks.

TWO LARGE TRUCK ORDERS.

What is elaimed to be the largest single order for motor trucks ever placed with one organization has just been given the International Motor Company, New York City, maker of Mack, Saurer and Hestit trucks, by the Star Motor Delivery Company of Chicago. This otheren is one of the largest in the country doing a general public trucking and transportation business, and has ordered 5.0 Mack machines of varying sizes, to be placed in service within the next few months for handling deliverses for Chicago merchants.

The City Fuel Conjunty, also of Chicago, has ordered 2. Saurer vehicles for its cash delivery work, and in putting the first 1.5 of them in service, which will be done shortly, 7a double teams will be displaced. It is said that beforehaving the order the company carried on a thorough linestification extending over two years, so that its develsion is a decided compilment to montor transportation as a whole as well as the Saurer truck. The 2.5 trucks will displace 10b horses and 2.5 wagons.

CHARACTERISTICS OF TRUCK DESIGN.

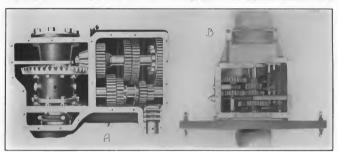
Some of the Designs for Transmission Gearset and Differential Cases, and Jackshaft Assemblies, with Constructional Features---Typical Examples of Chain Cases.

THE efficiency of any service wagon driven by an internal explosion engine to a very large measure depends upon the manner of power spillenton. The energy is created by the motor and it is transmitted through a driving system to the traction or road wicels. This system may be any one of several recognized by engineers as reliable and dependable, yet of these but one will afford aisolate option as to the exact speed of the vehicle. This is the roller traction or frietion drive.

To obtain to some degree the variation of vehicle speed that is desirable and efficient, with a reasonable regard for engine limitations, the reduction gearset has been employed, and this device has been designated as "transmission," which is in every sense a misnomer. There is, of course, a system for the transmission of power, which includes the gearset, but this may be one of several recepWith the conventional reduction there is the maximum, intermediate and the minimum ratios, the maximum often being the speed of the engine, the others, for the purpose of illustration, being two-thirds speed and one-third speed.

With pleasure vehicle engines, where the weight carried is small and speed is the easemital, three steps or two reductions are generally resarded as sufficient, but occasionally at fourth step is used where the road wheel shafts will revolve faster than the engine shaft. This construction is not generally used in ears of moderate price, its chief value is obtaining high speed under extremely favorable conditions.

With the service wagon, however, particularly if of large capacity, the need of more gradual power application is found and this has led to the adoption by several engineers of the gearset with four ratios, or the maximum and three



A, the Combination Gearcase and Differential Housing of the Garford Flve-Ton Truckt B, the Four-Speed Gearset of the Newark 25-Ton Wagon, Worm Briven.

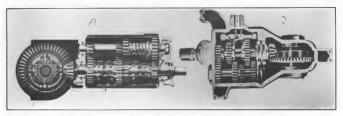
nized types, the main purpose being to apply the power at right angles to the engine shaft. Very generally, however, the word "transmission" has been applied specifically to the means for reducing the application of power.

There is no accepted standard of reduction ratios. There are engineering principles to be observed, naurally, but the relation of engine shaft and road wheel shaft movement when not directly driven may vary according to the desire of the engineer, this being determined by differing means. It is understood, of course, that the power productiveness of each motor differs, but under any rirgumstances it is dependent upon engine speed, and, taken as an average, it may be said that there is a uniform increase of effective energy from the minimum to the maximum number of revolutions. Beyond the maximum the power decreases approximately as it increases.

Then it will be seen that to obtain the greatest power an engine should be driven at a stated speed and with a reduction gear it is possible to apply it more slowly, proportionate to the ratios decided upon as being the most useful. There is no lessening of power with a gearset, save full. There is no lessening of power with a gearset, save full the slight (rictional loss, but greater leverage is applied.

reductions. In no instance has there been increase of road wheel shaft speed beyond that of the engine shaft, This type has been adopted for the Peerless, Lozier, Locumobile and Garford five-ton trucks, for the Peerless four-ton truck, for the Peerless and the Lauth-Juergean thee-ton trucks, the Newark 2.3-ton delivery wagon, the Lauth-Juergeans twoton wagon, and for the Newark and the Garford 1.5-ton wagon, as well as for other makes, these examples being specified to establish the fact that tractivity all velicies save the smallest have been included and that size or capacity is no actual criterion for need.

Any genrect must necessarily be subjected to sovere streams. One of the greatest cares by designers, is to insure construction that will endure under all conditions of service. The service waxon motor is slower as a rule than those built for speed and there is not the same elasticity with the former as with the latter. The purpose of the genrest of four ratios is to heter utilize the power and to more hearly approach a constant or uniform speed. Theoretically the engine should be driven at a standard for efficiency, which should be with regard to economy of fuel and lubricant and the least wear of the moving parts. If it



A, the Sternberg Genract and the Differential in Longitudinal Section: B. Ton View of the Wilcox Transmission, the Differen-(in) and the Supporting Arms

is practical to more effectively apply the power and obtain a given work with lessened consumption of oil and gasoline there is a distinct saving, and this has been the purpose of those who have adopted the four-speed transmission.

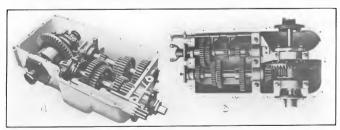
This type has been found to be very serviceable in every day use. It has distinct advantages as compared with the three-speed form and while it cannot be said that experience will bring about further increase of ratios it is a fact that this would be the ideal. The cost is necessarily larger than for the three-speed type and it has more moving parts, but these factors do not measure up to the gain made in better utilizing the power. Besides, there is generally lessened wear upon the vehicle as a whole, which is a matter of decided importance. The tendency with the majority of service wagon designers is to make the gearset large and enduring. Every component is proportioned with this purpose in view. The guarcase is heavy, the shafts sturdy enough to withstand springing, the gears wide and substantial and the bearings of a size to stand up under the continued stresses. The weight is not so much considered as the certainty of endurance and this is something that must be insured by all builders.

In the construction of the gearsets there are those who incorporate them with the jackshaft assembly, practically as a unit, and those who separate them. Some of the best examples of the unit construction are the Peerless, in which the gear set and the differential are housed in a single aluminum case, there being no division of the housing; the Locomobile, in which there is a dividing web between the gearset and the differential assembly, carried in a bronze case with an aluminum lubricant reservoir below

both sections; the Garford, in which the gearset and jackshaft differential are in a single case, but separated by a web that carries pinion shaft and countershaft bearings; the Lauth-Juergens, in which both the transmission and the differential are similarly housed with a web dividing the case; the Lozier, which has the gearset as a separate assembly from the jackshaft, and the Newark, in which there is a coupling of the main shaft with a driving shaft carrying a worm gear above the rear axle assembly,

Of these the Peerless, the Locomobile, the Garford fiveton, the Lauth-Juergens and the Newark have gearsets with three reductions below the maximum, but the Lozier has the direct drive with two decreased ratios and one increase above the engine speed. The Garford 1.5-ton wagon has the same type of gearset as the Lozier so far as speed ratios are concerned. All of these save the small Garford have the countershaft of the gearset beside the driving shaft. and in the construction specified the countershaft is beneath the main shaft. Acressibility and ease of work when this is necessary, are two qualities sought that are seemingly fully realized

Turning to the three-ratio gearsets, some excellent examples of construction are to be noted in the Wilcox, Sternberg, Knox and Avery, in which the assembly is in combination with the differential, each being a representative type. Of these the Sternberg is e-pecially interesting in that all the gears are constantly in mesh and the changes are made by siiding individual jaw clutches on the main shaft. It is claimed for this construction that with the gears unchanged there is little wear, and with an aggregate parallel working face of 2.5 square inches for each set of



A, the Peerless Transmission and Differential Cosing with the Cover Plate Removed: B, the Lauth-Joergens Genraet, Showing the Jackshaft Housing in Part.



The Installation of the Knox Transmission and Jackshuft, the Genract Being Enclosed in a Mattenbie fron Case,

jaw clutches the strain and shock is minimized. The clutches are double-ended and may be engaged perfectly without the possibility of damage or stripping, no matter what the circumstances. With this gearset the counterslaft is mounted above the driving shaft. When the drives is direct the two shafts are locked together and the gear is thrown out of mesh, the gears and the countershaft being idle. The sear is thrown back into position by the action of a suring when the silding clutch is brought from direct into neutral. The transmission case and the differential housing of the jackshaft are assembled practically as one, there being the web between the two to carry the bearings for the geares. The differential may be reached by a rear plate in the case which will permit work on the gears and the bearings.

The Wilcox transmission is conventional in its general design, but is made with nunsually heavy shifts and wide design, but is made with nunsually heavy shifts and wide scar faces so as to endure under extremes of service. There are so as me comment may be made of the Knox transmissions, two the number, which are varied practically only in proportions. The general is mounted in a malteable from case that is as sembled with the jackshaft so that the two housings form practically a unit.

The Avery gearset resembles the Sternberg so far as the position of the shafts is concerned, the countershaft, however, being below the driving shaft instead of above it. The accepted form of construction with gears sliding on the squared driving shaft meshing with fixed gears on the driven shaft is employed. The transmission is not assemisled with the jackshaft housing but the calangs are botted together. The Pederal design has the transmission case, containing the gearset, botted to the jackshaft housing, there being two distinct elements. The transmission construction is with the shafts side by side:

The manner of suspension of the gearcases differs ma-With the Peerless, for Instance, the assembly is mounted on a cross member forward and the rear is supported by the jackshaft which is housed in a sturdy shell mounted in brackets fixed to the side members of the chassis frame. As a rule, as the jackshaft housing is designed to take the thrust of the traction wheels through the radius rods, and the strains of braking through the drag of the driving chains, the assembly is heavy and ought to endure much longer than the life of the vehicle. Wherever the design has been well thought out the construction is such as to provide for compensation for the distortion of the chasels frame and to prevent side leverage of the driving shafts on the bearings. With many of the machines the cuter ends of the driving shafts are mounted on annular ball hearings that are installed under the centre line of

the chain sprockets. This is the Peerless installation. The Lozier construction is distinctive in that the jackshaft and gearset, as separate units, have a driving shaft between them. The transmission is mounted with the motor and clutch in a sub-frame and the entire power plant is carried on a pair of longitudinal auxiliary springs attached to the side members of the chassis frame, the rear end of the sub-frame being bolted to a frame cross member. As the sub-frame carries the radiator and the ignition system it is possible to remove it entirely from the frame with comparative ease. The jackshaft and differential are an assembly enclosed by a pressed steel housing suspended from the frame by two steel brackets. At the outer ends of the jackshaft shell are adjustable cages that carry roller bearings directly under the centre of the sprockets. The cages are spherical in form and these ball-shaped members are mounted in split eccentrics which form the forward supports for the radius rods. The eccentrics mesh with worm cuts on shafts that extend through the radius rod caps in vertical positions. The ends of the rods are squared and by the use of a wrench the radius rods may be adjusted as desired, loosening or tightening the chains as desired. The drive shaft between the gearset and the Jackshaft shell is carried in a pressed steel torque tube, the front end of which carries a sliding sleeve with a spherical forward end, which is mounted in a housing at the rear of the transmission case. This housing is oil and dust proof and protects the universal joint and bearings from destructive influences.

With the Locomobile design the transmission case and the Jackshaft housing are boiled together and the Jackshaft shell is carried in spherical hearings in brackets attached to the side members of the frame. Distortion of the classis frame is compensated by these spherical hearings and as the Jackshaft and the transmission case are rikidly boiled together there is no possibility of the generat or the differential and driving sinific heiga affected. A glance at this assembly impresses one with its proportions, and that it is not a probable cause for trouble is very certain.

in the Sternberg clinesis the power plant and clutch are varried in the forward end of a subframe and the rear of this sub-frame is mounted on a steel bridge that is holied to the jackshaft hangers. The transmission case is solied to the differential case and the former is suspended on four arms on the sub-frame, the driving shaft extending between the clutch and the transmission, with two universal joints. It is claimed for this that it is impossible for the driving system to become misaligned, while the endurance of the mechanism is correspondingly increased.

The Lauth-Juergens transmission case is aluminum alloy and is very large and strong, it being supported at either side at the rear by the Jackshaft housing, to which it is



The Locomobile Gearset, Showing the Unsembly of the Jackshaft and the Casing, and the Unusually Heavy Housing.

securely bolted. The forward end is suspended from a heavy frame cross member.

The Knox transmission is suspended at the forward end by a curved cross member of the chassis to which it is bolted, and at the rear by the differential housing, which is mounted in heavy steel hangers attached to the chassis frame side members.

The Newark tracks of 1.5 and 2.25 tous espacity have the unit power plant in which the motor and the clutch bousings are supported by side arms botted to the classis frame, and the transmission case is bolted to the flywheel casing forward and is supported at the rear by a pair of arms fixed to the chassis frame, these arms serving as a chassis cross member, and carrying a spherical socket into which is fitted the forward end of the torsion tube and a member that serves as a coupling for the driving shaft.

The Garford construction for the five-ton trucks has the transmission and the differential enclosed in a very large housing which is supported by the jackshaft shell at the rear and a cross member of the chassis frame forward. The hangers supporting the jackshaft are anusually large and

the assembly has an appearance that is decidedly bulky. Considering the use and the atresses upon threse components there is no doubt of the need of an ample margin of safety. The jackshaft is suspended very low and the angle of inclination of the radius rods is small, giving very sear-just and the result of the same of the same

The greater number of service warons are chain driven; that is, by side chaits from the jackshaft to the dead rear axie, this construction being favored because of the very heavy stresses upon the axies from the loads carried. The proportion of the loads carried. The proportion of the loads weight upon the rear axie varies decidedly, from 60 to 35 per cent, but the average may be assumed to be perhaps 75 per cent. The side chain drive is exceedingly efficient if the chains are clean and well intricated and the method has

the quality of simplicity that is very desirable. Under ideal conditions the chain form of power transmission is at least the equal of any other, but the chains when exposed, quickly become covered with dust or mud which, retained by the lubricant, cause loss of power and material wear.

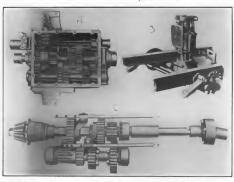
To secure the height of efficiency of the chain drive and

to minimize the wear chain guards have been applied by a number of designers. It is not judicious to employ cases that are not substantial and enduring, and the desire is to that are not substantial and enduring, and the desire is to that are not substantial and enduring, and the desire is to substantial and enduring and the desire to the substantial like the substantial and enduring and the substantial that we were often damaged by an found by experience that these were often damaged by an found by experience that the heavy chicles because of the large diffusive root with the heavy chicles because of the large diffusive of the damaged of the and the necessity of affording them a milliciant clearance, this bringing the lower edges of the cases close to the ground.

Because of the guards being carried by the rear axic.

and subjected to extreme vibration from road stresses, the first installations were generally found too light so far as the frames were concerned and the metal quickly be-arine fatigued and broke. This led to heavier cases and consequently better results. Instead of the lish sheet irns or steel housings that were not enduring, practise has demonstrated that it is best to have leavier cases that could be solidly bolted together and which, when supplied with lubricant, retained the oil of greans and gave satisfactory protection grainst abrasite substances. With guards the wear of the challes and sprockets has been minimized, and while this is a saving worthy of consideration, the economy of the time of cleaning and adjusting is another, to say nothing of the very much more important factor of maximum efficiency.

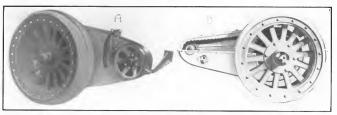
As the side chains are carried on sprockets at the ends of the Jackshaft, and the Jackshaft is supported by hangers from the chassis frame the chain case must completely enclose the sprockets and the chain with a considerable elemance that the chains may be adjusted. While the adjustment of the chains may be comparatively slight under ordi-



Transmission Constructions and Assemblies: A, the Loxier Four-Speed Gearset: B, the Federal Jackshaff and Gearcase in the Chassis C, the Avery Briting Shaft, Platon Shaft and Transmission Gears.

nary circumstances, it is necessary to provide for adjusting. With some constructions this is accomplished by moving the jackshaft in its brackets with exactness, a releasing coupling in the driving shaft preventing end thrust upon the transmission and clutch. With others the erar axies and the Jackshafts are fixed and the chalins are shortened as may be desired, by the use of half flinks or whole links.

The relation of the rear axle and the jackshaft is maintained by radius rods that are provided with means of adjustment at the Jackshaft. Where the service brake is carried at the outer outs of the Jackshaft the spreakest and the radius rods are also outside of the classis frame, and as the rase must be supported this necesstates the fourth strachment to the Jackshaft housing. The guard must be movable so that the chassis frame may rise and fall without restraint or bringing strain upon the casing, this being true of the rear as well as the forward attachment. The outer side of the rear of the case generally surrounds the brake drum, these drums occasionally carrying the rear spreakes.



Some Examples of Chain Cases: A, the Loxier Pressed Steel Guard: B, the Stegeman Cast Steel Housing That Serves as a Radius Rod,

the jackshaft.

The inner side is fitted to the axie, sometimes firmly fixed.

These cases are sometimes made with a skeleton to enclose the chains and the sprockets, this construction reducing the weight. Such is the design used with the Sandusky wagons, there being a clearance of several inches for the chains to slacken through wear. As a rule, however, the cases are not so lightened. Some of them are of cast steel, others of pressed steel, the former type being generally made with bridge work inside to minimize the weight. The cast steel housings are usually very rigid and substantial and are much lighter than they appear. They are all made in sections, some with the dividing line on the centre of the jackshaft and the rear axle, some with a third section that may be removed so that the rear sprocket may be examined and work performed on the chain at the rear, while others are with the inner side and frame cast recessed and fitted on before the wheel is installed, with the outer side divided iongitudinally in the centre.

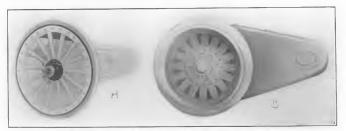
The usual manner of attaching the case is by bolting the sections together with a series of small bolts, but as these are all readily accessible from the outside there is but little labor required to sufficiently expose the interior of the case for any necessary work. Most of the cases are fitted with large handholes and cover plates that are clamped tightly, so that examination may be made or jubricant supplied in a comparatively brief period.

The chain guard will undoubtedly become more generally used because the cost is very small compared with its serviceability, and as the chain driven vehicle is regarded by many as being the simplest form of construction there is no good reason why the fullest protection that is possible should not be given, and the greatest efficiency obtained. The Lozler five-ton truck chain case is formed of pressed steel, divided longitudinally and boited together. The inspection hole is in the upper half. The case is mounted with a large brass collar rotating in a groove in it, this collar being carried by the jackshaft sprocket, so that the chain may be adjusted without disturbing the case. With the Stegeman truck the chain case is a steel casting strengthened by bridge work and serves as a radius rod, there being

an adjusting device by which the thrust of the rear axie from driving stresses is equalized upon the outer end of FRENCH WAR TRIALS FOR SUBSIDY.

During July the French War Department is to conduct trials of motor trucks with a view to determining the grade scale of subsidies allowed by the French government to owners of trucks which are fit for military, as well as for commercial work. The trials are to be conducted with Versailles as a centre, with all vehicles parked in the historic place every night, under military guard. At present 16 manufacturers have entered 76 machines, so that there will be no lack of contestants.

Newburyport, Mass., is to purchase an automobile chemical truck, the city council having voted to that effect recently. The chief of the fire department has been advocating the purchase of such a machine, believing that it would result in economy to the city and afford better fire protection as well.



Two Forms of Chain Housings: A, the Sandusky Lightened Guard: II, the Pressed Steel Avery Case,

PUBLIC COMMERCIAL CAR SERVICE STATION.

Methods Which Insure Proper Care and Constant Use to Business Men Who Are
Unable to Maintain Their Own Vehicles with Economy---Some Suggestions
as to the Necessary System for Solving a Decidedly Timely Problem.

THE business man who maintains his own delivery equipment meets with a serious problem when he considers changing from animal to motor wagons. Experience has demonstrated that it is economical to stable the horses and

DAY REPORT-TRUCK SERVICE,										
			Out	In	Out	in .	odometer read-	Gasoline, gala	OH, 918	Grease, lbs
Truck	No.	5	6,55	11.46	12,35	5.20	1728.6	15	3	ī
Truck		2	7.04	12.15	1.10	6.05	3308.2	10	2	
Truck	No.	9	7.12	11.55	1.02	5.50	4117.5	1.0		
Truck		ī				6.10	2778.3	1.0	3	- 2
Truck			7.27	12 07	1.05	5.38	1561.9	8	i	
Truck		3	7,32			7.14	5126.0	12	2	
Truck			7.36	11.48	12,50	5.41	3811.4	1.8	4	- 1
Truck		6	7.41			6.17	2812 8	10		
Truck	No.	8	7.44			6.29	4614.1	15	2	4

Form 1, Sufficient Length for Entry of Record of Ench Truck Dully-Sent to Office by Foreman,

provide attention as compares with the service of public stables. It is assumed that the ratio of economy increases with the number of animats used. Having knowledge of stabiling and rare and maintenance expense the inquirer often accepts, sometimes without question, a continuation of this system as being imperative to realize the fullest value of the power vehicles. Having experience as owner of a pleasure car and not differentiating clearly that this machine has been used with more or less indifference to expense, and basing conclusions upon suppositions and insufficient information, the prospective purchaser frequenbly decides that he ought to be independent of all public service to obtain the most practical results.

With the single animal or the team as a unit a delivery may have been developed, but what may appear to be culpment of considerable proportions shrinks decidedly when the motor truck, for instance, takes the place of three two-borss teams. The stable that has been sufficient for 12 horses and six wagons, to illustrate, is seemingly much too large for merely shellering two trucks. Quarter the barn floor area will suffice to house the machines, and adde from a work beach and small storage fallithes nothing else is required. A gasoline storage tank is desirable, but not necessary. To continue the use of the stable as a garage appears to be a waste of money. To change to a smaller seems to be a logical conclusion.

Character of Care Required.

The trucks are not recarded as experiment. They are a light days are not recarded while the experience of others. It is necessary that they be serviceable during the day and this means that each driver must do a full day's work. Whatever care and attention is desirable ought to be given after working hours or the service of the machine lessues in vaine. Obviously the trucks should be systematically examined and adjustment or repair made immediately. If the drivers are capable of doing this mechanical work they cannot be expected to work extremely jon hours, and if the work is to be principally at night there must be exaugment that would not be required were it possible to

command the outside facilities available during working hours of the day.

nours of the day.

Regarding the condition practically it is realized that there may be many lagiths, when the care needed should be nothing more than washing, polishing, replenishing the fuel, lubricant and ware supplies, oiling and turning the grease cuss, filling the lamps and cleaning the tunging the state of the supplies of the

Obviously it is not economy to have a regular employee capable of doing the high class work essential to injure satisfactory operation of the trucks. He would not have enough to do to keep him occupied. If this service could be combined with another or others to warrant the employment of a skilled man that is another condition. Generally such combination is not possible and the average or usual situation to he met with is regarded. To hire a man for the work stated is an insurance, but it is not economy. To pay a man for the actual labor required would mean paying well for it, because a dependable mechanic could not be expected to devote himself to such employment unless his price were paid.

Then the condition is, that the man whose delivery service is such that he cannot afford a well equipped private garage to maintain it must either sacrifice some of the economy he seeks until it has increased to such proportion as will warrant every facility, a development that must nevesarily be slow and dependent to a considerable extent upon the satisfaction he gives to his patrons.

The Public Service Station.

The alternative is to turn to the public service stations, which are generally devoted to pleasure vehicles, and with these the methods usually the vozue are not conductive to the character of service a business man must have. There are stations where admirable attention is given, but what is stated applies generally and not specifically to all. Under ordinary circumstances the mechanical force is employed during the day, and night work is an accommodation. Overtime must be paid for at regular rates. The night workers

TROUBLE REPORT.

Truck No. 4—

Loose service brake
Carburetor flooding
Truck No. 5—

Leaking gasoline tank
Truck No. 5—

Knock in motor

Form 2, of Size to Weet Requirements—Sent to Office by

are cleaners as a rule and few stations pretend to afford the same character of service day and night. In such stations, too, the drivers do not have access to the mackine and tool facilities and the stock, for these are never left accessiing preventions of leakage and loss.

Contrasting the private and the public garage the rental of the one must be as against the price paid for storage.

SEGGESTIONS TO OWNER.

Date O'Noill & Mulligan Truck No. 5-Brakes relined (necessary) Cylinders claused Ranair left rear tire (necessary) Probable time required

Form 3, Small Sheet, Padded, in Two Colors of Paper-Original Sent to Owner and Copy to Office for Record.

The washing, polishing, protection and the working facilities for the driver in the station are included in the cost, and the last mentioned offsets the expense for some equipment. The difference in coat of gasoline, oil, grease, waste, and similar supplies eventually eats up the initial cost of a storage tank and fittings. There must be a profit for the station, but the real concern with the truck owner is not that profit, but his own, to insure which he must keep his machines as continuously in operation as is possible,

The rapidly increasing utilization of the motor wagon has brought the husiness man to require of the public garage a character and quality of service not previously demanded, and the garage manager faces a problem that is quite as perplexing as that the truck owner is contemplating. It is apparent that this condition must be met and that it must be purely on a basis of business merit. No other factors are worthy of attention. The principal husiness of many garages will eventually be with service wagons and this being so the earlier this foundation is reached the better. It is possible for the garage to afford to owners of wagons who desire service a better attention than they could secure in their own stations, and at a cost that is sufficiently economical to satisfy them under all conditions. A Concrete Example.

The example of service is that given by the Central Garage, Pawtucket, R. I., conducted by Fred H. L. James. Mr. James is a draftsman by profession who advanced to the management of a large and extremely high class machine works, and has an experience that has been especially valuable to him. His health required him to ahandon work for several years and be engaged in his present business because it was convenient to his home and permitted him to be out of doors the greater part of his time.

Mr. James' knowledge of business methods and men was such that he met conditions as they arose with entire success, and he has developed in connection with his garage a service that is in every way practical, economical to his patrons and sufficiently profitable to justify this class of custom quite as much as any other. For the benefit of those who may seek to profit by the suggestions of this article it should be stated that the prices charged at the garage are average. When Mr. James took over the business there were numerous losses and leaks that were sought and remedied. This was a condition that might obtain with any man. Eventually a system was adopted that has proven extremely satisfactory in every respect. Emphasis is made of system because suggestions are made that may be employed to good advantage in following the general idea of a service for motor wagons, and it is imperative with any business to have record of every transaction in the simplest and most practical form. It should be said that these are not the forms used by the Central Garage, but are what appear to be desirable with any volume of business of this nature. Arrangement of Cars.

It may be well to state that at times the combination

hie to those not responsible. The lock and key are surpris- service causes conditions that are unavoidable where the two classes of vehicles are in storage, particularly Sundays when rain falls and it is necessary to work on the trucks, for they take up much floor space and with cars constantly going and returning there is necessarily congestion. It is not possible to interfere with the work on the trucks and it cannot be slighted, so that to obtain the most practical results a systematic arrangentent of the cars in the garage is first of all to be decided on. Other days the trucks are worked during business hours and it is seidom that more than one at a time is receiving attention, so that space is not so greatly needed.

The service referred to was started with a single truck and it has been so well conducted that now five firms having one and two trucks avail themselves of it rather than establish their own garages. The prospects are that this will be largely developed the present season. It is probable that this will lead to a separate station, wholly for the trucks and wagons

The attention given is of two classes. The one is a standing order for such work as is necessary to maintain the trucks in a thoroughly serviceable condition. The other is where work is authorized by the firms upon notification of conditions. The expectation is that the machines will be ready for work each morning and this requirement must be met. in several instances this has meant work the entire night for some of the men, hut in only two iustances has there been failure; once when an engine case was damaged beyond any form of repair save welding, and another time when a shaft was not delivered as ordered. Taking four years' service this is a thoroughly husinessilke showing. The Service tilven,

The service first covers storage during the time the trucks are not in use, daily washing and polishing, oiling and tightening the grease cups, filling and cleaning the lamps, cleaning the engine, and replenishing the fuel, water and jubricant. The care is for a regular monthly charge. The supplies are charged in the quantities used. The most important thing is the attention to the mechanical condition of the trucks. The foundation of this is the reports made by the drivers, who are required to report to the foreman or the office any trouble experienced or conditions noted during the work of the day. When the trucks are driven into the garage the engines are operated within the bearing and observation of the foreman or Mr. James, and usually any derangement or fault may be detected. if there are in the reports any evidences of needs of adjustments, breakages, or damage or wear, these are inquired into immediately and necessary work is begun at once.

Experience has proven that it is well to take all the time available, hecause of possibilities of other developments, and as the mechanical force is limited no chances

AUTHORIZED REPAIRS-SPECIAL WORK,

Date

Truck No. Owner Hubbard & Hotchkiss

1 Weld crankcase 2 New high speed transmission gear

2 Reputr radiator

1 Sent to J. F. Ellis Company, Rochester, N. Y. 2 Gear blank forged in shop, cut by Willis & Baker 3 Sent to maker, Fedders Company, Buffalo, N. Y.

Form 4, Smail Sheet, Padded, in Twn Colors of Paper.... Original Seat to Owner and Copy to Office.

can be taken. Where a work can be completed it is taken care of, but in some instances a temporary repair is made until restoration of a permanent nature or replacement is practical. There are times when the tightening of a bolt or the adjustment of a part will mean the saving of many dollars and nothing needed is left undoue, but as a rule the work each night is not such as to require much time. Because this care is taken daily there is but little to anticipate saide from actual breakage.

But each Sunday the trucks are systematically inspected and gone over. The engine is run to determine its coudition, the radiating, ignition and lubricating systems are examined, the clutch is tested, the transmission cover is removed and the gears tried by feeling, the chains are icosened and the jackshaft, its bearings and differential are operated by hand to detect jost motion or wear, the brakes are operated and the connections gone over. Next the wheels are jacked and the condition of the bearings learned by testing with a pinch har, and the steering gear and the iever arm, tiebar, knuckies and pivots are examined carefully. The radius rods and chains are looked over and the springs are seen to. The work is thorough and the men tighten every bolt that is siack, make such adjustments as are needed, and test the trucks on a short but steep bill. The workmen are expert in the Inspections and the trucks are left ready for the work of the week to come. The charge for work is for the labor, plus the cost of any parts or material used

It is a rule that no work shall be regarded as completed unless it has been tested, and nothing is taken for granted. This means that when the trucks are worked on at hight they are tried out so that they will be in condition to use when the drivers call for them in the morning. The result of this service is that the tracks are always available and there is practically no time lost except when withdrawn for painting or perhaps an overhaul. The real economy is in having them always serviceable.

The Necessary Equipment,

The garage equipment must be equal to all demands made upon it. This does not mean unprofitable machine tools, but in special fittings that will make possible work out of the ordinary requirements. There should be at least one first class lathe with the regular and the special gears that will be useful in milling, for instance, thread cutting, and the like; a drill press is very useful, and other tools may be utilized to good advantage. A power air compressor is absolutely needed for the forge and brazing outfit. There should be a complete forge and the tools for working it, and the hand tools should be such that there will be enough for every worker. The stock of material should include bar nickel steel for shafts, steel tube for axle housings, har steel to five inches diameter for gear blanks, as well as the usual rod, har and sheet metal necessary in repalr work.

The workmen should be the best that can be secured and one of them ought to be a first class blacksmith, capable of doing any work. One of the faults with most garages is that they have the forges and no men who can do the work reculred. To illustrate in the event of a gear being needed and the maker a long distance away it is possible to forge a steel hiank and have it cut outside, for few stations have milling or gear cutting machines. A broken front axie may be plated and brazed for a temporary or even a permanent repair, and fractured rods and parts welded or hand forged. A good blacksmith can fit the work he is making and minimize the other jabor upon it. The better the machine men understand the value of their tools the more satisfactory the resuits. A broken axle shaft can be replaced, even to miliing the square ends and cutting the threads, on an ordinary lathe. No end of work can be accomplished with the lathe. which is the most useful of tools.

The Garage Manager.

The resourcefulness of the garage manager is a large asset in business. To meet an emergency and deliver the

trucks on time is what brings him patronage and retains his customers. Only in the event of impossibilities should he fail, and then he must give sufficient notification to the firms dependent upon him to permit arrangements to he

					111
	Janting	Repairs	Parte	Supplies	Fotal Mileage
	5	2	£	800	To
Engine— Compression Valve timing. Cylinder condition					
Ignition— Magneto circuit. Battery circuit. Spark pluge. Cables Battery vottage.					
Cooting— Radiator Fan Pump					
Lubrication— Pump Sight feed Piping system Level and drain cocks Reservoir					ŀ
Clutch— Engagement Slipping Condition					ı
Transmission— Gears Bearings itand lever Condition					
Brakes— Hand lever. Foot pedal.					İ
Driving System— Shaft Universal joints Jackshaft Differentiat Sprockets Chains Radius rods					
Wheels and Axics— licar sixle. Bearings Brake drums Condition Front sixle. Spindies Pivots Yokes					
Tires Condition					
Steering Gear— Post and connections. Draglink Tiebar Condition			-		
Springs— Clips Saddles Shackles					
Grease Cups. Oll Laps. Oll Laps. Oll Caps. Oll Caps. Gssoline Tank Oll Tank Tested Before Adjusting. Tested dier Adjusting. Tested After Adjusting. Tested After Repair. Tested After Repair.					

Form 5, Ruled to Be Filled in by a Note in the Appropriate Column for Each Item Stated, and Signed by Those Doing the Work and Testing—Original to Owner and Copy to Office.

made for the delivery to continue. A broken engine case of aluminum cannot be welded with ordinary garage facilities and a repair is not even guaranteed by those who specialize repairing, it must be sent to the specialist or the maker or replaced. Such an accident means unavoidable delay provided the engine cannot be replaced by another.

Where the truck is built a long distance from the owner it is well for the buyer to have on hand such parts as might be needed at any time. If there is an agent within a reasonable distance he may be depended upon for replacements, but there may be some delay in securing them in the event of emergency. If the maker has a branch, or if the factory is near at hand the need of parts need not be apprehended. The garage, however, cannot be expected to carry parts unless it is agent. In considering service it is well to understand the possibilities in the event of necessary restoration and to make the provision that appears wise to do. This is a matter that the owner, and not the service station manager, has to deal with.

Desirable Forms.

For the benefit of those who might desire to adapt their service to trucks a series of forms has been prepared which are practically self-explanatory. The first is the day report,

MONTHLY REPORT, Date Truck, No. Owner, Hubbard & Hotchkiss Hours of service (Out of Garage) Mileage, odometer reading to to Gasoline (total galions supplied) Lubricants-Oil. (cylinder) gallons Grease, (gear and transmission) pounds Supplies-Spark plugs Cable Gaskets Boits and nuts Brake lining Mudguard bracket Eight valve springs Fan belt Labor-.... Repairing mudguard Adjusting ignition system Timing valves Replacing fan belt Adjusting brakes and relining shoes Suggestions...

Form 6, Signed by Garage Manager in Duplicate, Original to Owner, Copy to Office,

which conforms to law in many states as to the registration of odenice leaving and entering a garage, together with the odometer reading, the quantity of gasoline, oil and grease supplied for replenishment. The second is the report of the foreman which notes the conditions reported by the drivers.

The third is a statement of necessary and desirable repairs to be sent to the owners as official notification, this establishing a responsibility for any condition that might arise for failure to authorite the work genetic. The fourth is the statement of outside work sent away, to establish any cause for delay or failure when returned, and that the charges were legitimate. The fifth is a weekly inspection and work record, which Indicates that all pairs of the machine received attention and that adjustment, repair or replacement was made, with the time for the work, toxether with such supplies as were necessary and a reading of the odomester to show the work of the truck during the week. The sixth is a monthly report to accompany the bill, which gives the hours of service for the month, the mileage, the sixth as in the service of the month the mileage, the mileage the mileage.

fuel, oil and grease used, the supplies furnished, the parts required, the charges for labor other than regular attention, with a summary of the condition of the truck and suggestions as to work needed or desirable.

It will be understood that the value of the weekly report is to show that the truck was systematically examined and the proper care given. The monthly report details the cost of operation aside from the service charge, which, with the other detail available, gives the owner an accurate account of the expense of operation. As it is for the interest of the station to keep the expense within reasonable limits, and as the owner desires economy, the reports are equally valuable.

SUMMER INFLUENCES TRUCK SALES.

With the approach of summer, truck purchases have been increasing in number steadily, and next July and August will without doubt see fewer horses than ever tolling in the hot city streets and rendering them unasalitary, according to Glesson Murphy of the General Motors Truck Company. During the beated period flast summers in Section 1997, and the second of the second section of the larger energy as the probabilistic discretization sections of the larger energy.

VELIE FOR ARSENAL.

The United States government has purchased a Vellethree-ton truck for the use of the arsenal at Rock Island, Ill., as a result of careful tests by the ordnance department. The truck will be used for the handling of ammunition caissons, powder, shelis and the heavier supplies, which work has heretofore required many horses. It already has demonstrated its value, having done remarkable work under all sorts of road conditions, at times towing three loaded hox cars as trailers.

NEW BEDFORD WANTS MOTORS.

A new motor driven ambulance, patrol wagon, and a product or an are needed in New Bedford, Mass., according to H. W. Mason, beit of the police department, and the proposition is being considered by the city authorities. Chief Mason has some ideas of his own as to bodies, and wishes the city to purchase the chassis and have bodies fitted to bid designs by local firms. The city was an early purchaser of motor equipment, and still operates an automobile ambulance. This is, however, now too old to render efficient service as it did at first. While it seems that the city needs motor equipment immediately, it is probable that it will not be purchased until the new police station is constructed and room gained in which to house the new machines.

MORE PATROLS FOR NEW YORK.

Three more motor patrol vagons were recently put into commission in New York City, making the complement of horseless patrols five in number. The new cars are of the gasoline type, while the two electrics have been used for some time. If the new machines prove as satisfactory as is expected, it is stated that within a sbort time all of this class of vehicles in the city will be motor driven.

THE WAVERLEY INSTRUCTION BOOK.

The Waveriey Company, Indianapolis, Ind., has issued an instruction book for the use and operation of its selection trucks. It contains but 12 pages, and amply bears out the statement in the front that "The care and operation of tric commercial vehicles is no more trouble than stabilize horses."

MILTON NEEDS CHEMICAL TRUCK.

The Sbimer Hose Company, Milton, Penn, has started a campaign for a motor chemical truck, and as the city does not seem inclined to purchase it, a fund has been started to raise the necessary money among the citizens of the town. No machine has a syet been decided upon, but the hose company is hoping to get enough money to purchase one of the most modern type.

NEW SIGHT-SEEING CAR.

The General Motors Truck Company, Detroit, has brought out a new sight-seeing body which exhibits some distinct

characteristics it is a full for made and is a full for the old style. It has done from the old style. It has done if the pleasure car, having the appearance of an elongated to made a car. The seats are well arranged, the front two besine crossesses usuall, while the bank seat is semi-usuall, while the bank seat is semi-usuall, while the bank seat is semi-usuall, while the propie semi-usually self-usually self-usu

The chassis is a standard twon G. M. Construction, who as wheelbase of 142 inches. The first bus foliable was shipped to the Rainler National Park, near Seattle, Wash, and is to be used in conducting parties through the park to the line of ciernal snow an Mount Tacoma, along what is considered by some to be the greatest seemle automobile ride services as the considered by some to be the services as the considered by some to be the

A medicine chest with first aid remedies is provided. The car will cover the West Roxbury and Hyde Park districts, an area of nearly 50 square miles.

LEE TIRE COMPANY EXPANDS.

The tire business of the Lew Tire & Rubber Company, Conshohocken, Penn, has Increased to such an extent that during the past year it has outgrown its quarters in the new factory buildings which had been just completed, and B has now placed orders for additional machinery and equipment which will double the present output to almost 800 tires a day. The power plant will be increased, the present mill room doubled, the calculers triplicated, and the washcrs and vulcanizers duplicated. A new compound room is also to be built.

GRAMM COMPANY REORGANIZED.

At a meeting of the directors of the Gramm Motor Truck Company, Lima, O., May 23, the final reorganization of the company, the controlling interest of which was purchased recently by John N. Willys of the Willys-Overland Com-



ally, this work will prove a severe test for the new car. pany. Toledo, O., was completed. II, A. Gramm resigned

ADAMS EXPRESS ADDS MORE ELECTRICS.

The Adams Express Company, New York City, recently ordered 37 two-ton G. V. electries, produced by the General Vehicle Company, Long Island City, N. Y., making a total of 124 cars of this type which the company has purchased to date. That electric vehicles are popular with express companies is borneous by the fact that the American Express Company recently ordered 58 machines, the last five of which were delivered a short time ago.

COMBINATION PATROL FOR BOSTON.

The first combination motor patrol and police ambulance to be put into commission in Bission was recently installed in the West Robury station. The body is fitted in the interior with folding seats for 24 men, and can be used as an ambulance by simply folding up the swats and pincing the stretcher, which is carried on the wall, on the floor. pany, Toledo, O., was completed. B. A. Gramm resigned the vice presidency, and it is understood that he will reenter the commercial vehicle field with new designs in the near future.

The new list of officers follows: President and general unnanger, John N. Willigs: Vee president, G. W. Bennett, vice president, G. W. Bennett, vice president of the Willys-Overland Company; secretary, James E. Kepperley; treasurer, Walter Scott, assistant general reral manager and factory manager, Harvey L. Houke. Under the new Jam, the sales will be made through the commercial car department of the Willys-Overland Company, and the policy will be directly from Tolelo.

In this connection it is announced that Carl A. Neracher, who for several years was chief engineer of the Carfoot Company, Elytia, O., has been appointed consulting encineer of the Willys-Overland Company, and will have charge of this detail in connection with the Overland and Gramm products. Mr. Neracher's experience extends over several years. His headquarters will be at Tolech, although F. Bizzantz will remain as resident engineer of the Gramm plant at Jilms.

WAVERLEYS FOR DEPARTMENT STORE.

The Mandel Brothers department store, Chicago, has ordered a fleet of 10 Waverley electric light delivery cars, for city use in delivering the lighter merchandise. This order followed a competitive demonstration on the cost of maintenance and case of handling, and it is stated that the noiselessness of the cars also figured in the calculations of the company in giving the order, as it feels that a quiet electric gives customer a good impression.

LONG RUN WITH SAMPSON.

A Sampson motor truck, made by the Alden Sampson Manufacturing Company, Detroit, revently made a trip from New York to Baltimore, Md., with a full load of household goods. The distance is 180 miles and was covered in only 15 hours running time. Only one stop was made along the route, which ran through Trenton and Philadelphia. This is stated to be one of the longest motor truck household removals on record, and created a good deal of interest. The furniture carried by the machine arrived at its destination without a scratch, and of course much quicker than had it been sent by freight.

WESTFIELD WANTS MACHINES.

Westfield, Mass., would secure automobiles for municipal use, and an effort is being made to have the selectmen purchase machines for the use of street and engineering departments. The work of these two departments has increased steadily during the past few years, necessitating the superintendent of streets keeping a team at his own expense, in order to he able to direct the work in the different sections. The health and water departments both have machines and have found them of great value, it is stated, making it possible to cover more ground and thus accomplish more work, so that in view of the success of these it is not unlikely that the other vehicles desired will be purcious of the sections of the section of t

DECATUR FOR GENERAL TRUCKING.

George E. Sturdewall, who conducts a trucking bustness in Danhury, Conn., has just bought another motor truck, this time a two-ton Decatur, Hoosler Limited, made by the Grand Rapida Motor Truck Company, Grand Rapida, Mich. Mr. Sturdewant about a year ago purchased a Buick, and found it so ascessful that with an increase of husiness he decided to purchase a larger machine. He stated that the Buick frequently did the work of two horse teams, and that he expects the new machine to do even better than that.

NEW HAVEN CHIEF'S WAGONS.

The fire chiefs of the city of New Haven, Conn., have been furnished with two new Ford runabouts, and now lose no time in getting to fires. The machines are equipped with chime gongs instead of a born or whistle.

TRAVELLING MOTOR LIBRARY.

The latest use for the automobile is to furnish a conveyance for a travelling library, the public library of Hageratown, Md., using an International Hurvester wason for the purpose of delivering hooks from door to door in the raral districts of Maryland. The car has a van body which holds nearly 1000 volumes, some in special cases to he left at the 70 sub-stations of the library, and some on slockes for the selection of the farmers along the route where the population is too scattered to maintain substantions. The machine is fitted with a 29 horsepower motor and is especially equipped to travel over the mountain roads of that section.

G. M. C. TRUCKS ABROAD.

The General Motors (Europe), Ltd., has been incoporated in England, and will act as distributing agent for the General Motors Company lines in the British isles, continental Europe, Scandinavia, Russia, northern Africa, India, Burnah, Maiay and the East Indies. The foreign company is modeled on the lines of the well known American organization, of which the General Motor Truck Company, maker of G. M. C. gasoline and electric trucks, is a constituent.

HOSE WAGON FOR MANCHESTER

The firemen of Manchester, Conn., are of the opinion of that an automobile is needed in the department, to carry those and supplies for the South Manchester house. Already show and supplies for the South Manchester house. Already the department has several machines in operation with entire success. The South Manchester house is hand(capped by no thaving enough horses, particularly in the day time, when two of the animals are used by another city depart-in when two of the animals are used by another city depart-in the first
TRUCKS FOR JACKSONVILLE DOCKS.

The Jarksonville, Pla, docks of the Merchants and Mines Tarksonvillo, Company, are to be equipped with electric platform trucks to facilitate loading and unloading the steamens of the coastwise line. The purchase of the trucks had been contemplated for some time, but had been electric platform trucks and been contemplated for some time, but had been set has been installed and will now furnish the direct currerent necessary to operate the vehicles.

SALESMEN RELIEVE FARMERS.

A decidedly movel idea in selling automobiles to farmers was recently put into operation by western salesmen of the Valled States Motor Company. Farmers in the spring of United States Motor Company. Farmers in the spring of to bave time to take to allesmen, so one enterprising man evoiced the idea of carrying a farm band or two to releve the farmer while he looked over the car and took a demonstration. The scheme seems to have met with success, the farmers being willing to takk automobile when they knew that their work was not being delayed.

ALLIANCE GETS ELECTRIC PATROL.

Alliance, O., has purchased a new electric patrol wason and ambulance, and it has already proved its worth and advantages over the horse vehicle formerly used. It runs much quieter and smoother as well as faster, and several fast runs have been made from the scenes of accidents to the hospital.

LONDON'S 'BUSES MAKE MONEY.

According to news from London, the General Omablus Company there collects fares aggregating \$25,000 a week, which is \$50,000 more than the receipts of the tubes which were planned to secure the bulk of the traffic. Over \$60,000 was apent on these tubes by the county council, while the omnibus company is capitalized at only \$12,500,000.



BRIEF NEWS OF MANUFACTURER THE TRADE AND

Harrisburg

The Perfection Spring Company, Cleveland, O., has placed E. F. Lake in charge of its laboratory.

A. D. From has been appointed manager of the New York anch of the American Lorentotive Company, recently estab-Hisbard

The Mack Bros, Motor Cur Company, Allentown, Penn, has purchased six acres of land adjoining the plant and will erect an addition

The Gessler Williams Tire Campusy, Ionver, Col., has taken agency for the Swinehart tire, made by the Swinehart Tire & Bubber Company, Akres, O.

The Ruby Carbaretor Company has been incorporated in Indianapolis, Ind., with a capital of \$19,000 by F. S. Roby, C. J. Schuli and E. D. Sallabury.

The Harder Ania Track Company of Chicago has secured J. Pesta as sales manager. He was formerly with the Kissel F. J. Posta as sales manager. He Motor Car Company in Phicago.

Edward J. Gaillen, Jr., has been appointed assistant to the provident, and auditor of the Pierce-Arrow Motor Car Company, Buffalo, N. Y., maker of Petros-Arrow cars.

The Gewinner Company, Atlanta, Ga., has moved into new quarters at the corner of fluri's and Peachtree streets, occu-pying two floors of a new building which was recently erected,

The Kenny Mutne Cumpany, Physician Paper, has antichosoid

Baker Motor Vehicle Company, of the same city, in a similar enpacity.

H. R. Pfelffer of York, Petin, who has the agency for the laser electric in York, Lapraster and Adams counties, has added bouphin county to his territory and opened a garage in

The Miller Carburetter Company, Los Angeles, Cal., has de-ded to move in the Middle West, and has taken temporary quarters in Indianapolis, Ind., where the company will be closer to the industry.

The Steckle Motor Track Company, 1444 Ridge avenue, Philadelphia, has taken the agency of the B.O. E. trucks and Lincoln light delivery wagon for eastern Pennsylvania and southern New Jersey.

D. F. Poyer & Co., maker of Menomines trucks in Menomines, Mich., has purchased the Gram fartory buildings, the present equipment being too small. During the conling year a total. of 300 cars is to be made,

The Hartford Snapenalon Company, Jersey ('Hy, N. J., is shortly to place on the market a new spark plug. No details of the plug have been made public, but it is stated that it will be of the two-piece type.

New agents for the Adams trucks, made by the Adams Bros Company, Fluding, O., have been appointed as follows: Elec-



Fleet of timeford Taxicaba Operated by the Frank Parmelee Lompany in Chicago

ground man Beaver Falls, and is to erect a factory for the manufacture of pheasure and commercial cars

The Sulem III A Greuse Company is a new organization in Solom, Mass., with capital of \$55,000. Incorporators, A. H. Bowbetton, II. T. S. Smith, W. H. Bowbetton, II. T. S. Smith, W. H. Bowbetton, II. T. S. Smith, W. H. Bowbetton,

The Ross tiens & Taol tompany, making track steering grars in Lafayette, Ind. is to erest a new factory on North Eachth street, with 50,000 square feet of floor

The Herentes Tenek Company has been incorporated in Alex orderle, Va., with a capital of \$100,000. Incorporators, S. W. Wendward, C. Ducker, E. S. Parker, R. W. Parker

The Mather Spring Company, Toledo, C., has appointed G. Hrewo as sales manager, with headquarters in betrott, Mr. Brown was formerly with the Standard Sales (Company).

The Motor Wagon Company of New Jersey has been or-ganized in Newark, N J, to take the agency for the Letroit Electric delivery wagon and the White Star gasoline truck.

The Sinndard Molor Far Lompany, Daylon, O. has secured the accuse for Lippard-Siewart trucks in Isytum and adjacent territory. The cuncern also handles the Ilmison pleasure line.

Worman, formerly with the National Carbon Company, Cleveland, O. as advertising manager, has joined the

tric Service & Repair Company, Induth, Minn. Contral Autorice service & nejour company, round, sum, sum, conton accommodal company, Albary N. Y., Hongdond-Theyer, Inc., New-ark, N. J., L. G. Schoepdlin Company, Buffalo N. Y.; Millon G. Smith Anti-Company, South Bend, Ind., Commercial Auto & Bepair Company, San Autotro, Tex., When Auto Company, Warn, Tex

The Patterson Automobile Company, Hamilton, Can, recom-moved into a new garage at tool Kipg street. The extra-The Patterson Automobile company, by moved into a new garage at 800 King silect. The estab-lishment has storage from for 20 cars, and a complete report department and machine shop

The Downgine Motor Car Company, Downgine Mich. been taken over by the Tulsa Automobile & Manufacturing fompacy Tulsa, Okin Trucks in expacition of one half ton one tons are to be manufactured in Tubsu

The Frank Parmelce Company, Philosope, which has the best The Frank Parmeter tompans, Thicaks, Which has the need taxinab hustiness in that city purchased 60 Garford stachines during the past year. The step was impelled by the discovery that the competition of the company were hughing up all the second hand Gerford case they could get and placing taxteab holles on them the old care giving excellent service. Mr Parmeles had but considerable trouble with its machines, and decided to try the Garford, purchasing a few machines at first and adding the others from time to time

The International Motor Company, maker of Mack 1946ks. Alleutown, Penn has established a branch adegree in

Cleveland, O., at 1626 Walnut avenue. The Buffalo, N. Y. branch of the company has been moved to 1258 Main street,

The Kadix Newark Motor Truck Company has been incorporated in East Orange, N. J., and will maintacture motor trucks. The company is capitalized at \$200,000, and its composed of D. Lester Dann, G. F. Kallberg and Russell M. Politura,

The Hagsirum Bros, Manufacturing Company, Lindsborg, Kan, announces the addition of a new department for the manufacture of dies, tools, special machiners, ret. for the purpose of making the numerous specialties produced by the company.

The Teel Manufacturing Company, Medford, Mass, which has been making the Teel-Woodworth truck and had announced a new one-ton truck in complete its line, has abundoned the latter project and is to take the agency for the Federal truck instead.

A. R. Monier & Co. has moved to new quarters at Webster and Wakefield avenues, Yonkers, N. Y., where the new facing and office buildings styre more space and greater facilities. The factory is in a pleasant environment and is equipped with the most modern machiner.

The Magon Bros. Automobile Company, Holyoke, Mass., in to occupy the whole of the building in which its garage is located, at the corner of Division and Bailrond streets. The second floor is to be taken over and used partly as a showroom and partly for storage.

The Mota Tire & Rabber Company, Akron, O., has opened a branch in Cleveland, O., in order to take care of its rapidly growing husiness in that city. C R. Serfinss is in charge, and The Hant Rotter Hearing Company, betroft, has tested in brooklet form reproductions of its advertisements and is distributing the booklets to the sales and advertising managers of the automobile concerns handling cars equipped with Hant ruller bearings in order to furnish them with selling anyments.

W. F. Reymids has recently become sales manager of the Lappard-Siewart Mater Car Campany of Hoffalo, N. Y. He is well known to the animothic industry, having taken over the automobile business of John Wanamaker of Philadelphia in the fall of 1985, and since then has been prominently identified

Harry J. Kearan, formerly assistant to Berry Rockwell, advertising manager of the Makwell-Briseoe Motor Company, has become advertising manager of the Alax-drifteb Rubber Company, Trenton, N. J., which concern has an office in New York (1), at 1796 Broadway.

The Four Wheel Drive Automobile Company, Clintonville, Wis, making the Zachew-Researdich Four Wheel Drive pleasure and commercial cars, has found its present location inadequate and is booking for a location for a new plant. It access probable that Appleton, Wis, will be selected, as a number of residents of that town are interested in the company.

The Firstine Tre A Rubber Company, Alvon, O., is issuing a new bookist illustrating the Important Centure of the Firstine and General Rubber State of the Firstine and Firstine State of the Firstine

The Kissel Motor Car Cumpans, Chatford, Wis., the leased a large four-story building in Chicago, at the corner of 26th



Factory of the Biair Manufacturing Company, Newark, O., Where the Biair Direct Drive Truck, a Worm Driveo Vehicle, In

the agency will take care of the installation of the well known. Motz cushion these for Cleveland motorists.

George Giroox, manager of the truck sales department of the Chicago Pneumatic Tool Company, Chicago, has resigned to become manager of the Foraker Motor Truck Company, which is the Chicago agency for the Durable Dayton vehicle, made by the Dayton Auto Truck Company, Dayton, O.

The Piak Hubber Campany, New York Pily, recently opened new Pachie Caast headquarters in San Francisco, on Van Ness avenin. The building is two stories high, of reinforced concrete, and contains, besides the salesmons and offices a complete service department for repairs and vulcantians.

The Kilgore Manufacturing Company, Boston, has moved linto larger quarters at 882 Boyleton affect. The Air shock absorber which the company produces has been improved and may be had In a number of finishes to match any car, and Is now being manufactured in large slaves especially for trucks.

F. L. Admiss and W. P. Price have formed the Administrate Automobile Company at Admis, dis, and will handle the tribe swake line of commercial venicles, made by the Green of Power Wagon Company, letroit, Quirters have been secured on Deachtree street, where show rooms and a service station will be maintained.

The Poss Mojor (naipnes, Defroit, has injected a New England connection under the name of the Poss Mutur Company of New England at 121 Massachusetts avenue, Boxton, in order a rate better service to customers. Arrangements are being made for all ref service the depay where a full lime of parts with in which are the service depay where a full lime of parts

and Wahash avetues, and new occupies nearly 180,990 square feet of floor space, the largest devoted to the automobile business in the city. The building has been turned into a model service station.

By the Stater Works, Lauring, Mith, has leaved a int in Buston, at Commonwealth across and Hindale street, where a factory branch is to be erected. Salestrooms, offices and a service department will be operated. The building is to be of reinforced concrete, four stories high and will have a floor area of 30.000 square feet.

The Billings & Spencer Compaoy, Hartford, Crum, has discontinued by mutual connects the scilling arrangements with the Claire L. Barnes Company of Pideago, and will market its line of tools and ferrelings direct. The Billings & Spencer Company has more than doubled its capacity in the last two years and now has its new plant at Dividend, Cutum, in full operation.

The Histr Manufacturing Company, Newark, O., is now its sailed in its new factory and actively us work turning out the Blair direct drive truck. The factory is emitigied in the most modern fashion, with every manufacturing facility for making the worm driven vehicle which the company is featuring. See the continue of the control of th

The trand Rapids Motor Track, tompany, Grand Rapids, which produces the beautir timoster Limited models has opened a direct factory branch in Philadelphia at 219-217 North he maintained under the uninascented of D. Barl Mackett, Tide is in line with the polley of the new company, which compilates locating branches of this nature in all sections of

VOL. III. PAWTUCKET, R. I., IULY, 1912

No. 7

TRUCK EFFICIENCY IN LONG. HEAVY HAULS.

Practical Results with G. M. C. Machines in Delivery Service of Construction Material Dealers, Wholesale Sugar House and Furniture Mover-Jobbing Truckmen Have Abundant Work and Are Well Paid for Their Enterprise.

VERY business man feels that he cannot be guided by the experiences of others. He assumes and generally justly, that what may be profitable with others may be unprofitable with him, and as expense is the main factor to be considered in conducting any enterprise he is desirous of demonstrating to his own satisfaction what may be accomplished with a method or system under his administration. While he would not hesitate to undertake the distribution of an article or commodity, or to seek custom where competition would mean the smallest margins, or to invest capital in a business that must be developed and is largely if not wholly experimental, he is not willing to

trust his judgment fully when the propomition is greater economy in a direction where he is practically certain there can he a saving It is not too broad a statement to asy that with rare exceptions animal haulage is practically without system insofar as it relates to custom To lilustrate, theoretically there should be a standard

price estab-

lished for any product at the place of manufacture or distribution, and there should be a charge for delivery based on the actual cost of maintenance of the delivery. As a matter of fact the prices of the department store, for instance, are established on a different basis, and there is no difference in the selling value whether the product be delivered or carried away hy the customer. This generally accepted rule may he varied under some circumstances, but with rare exceptions, withir what is regarded as a reasonable distance, the charge is the same.

Where products are purchased in quantities and shipped

considerable distances the purchaser pays the freight or express charges, but immediately when placed on sale a flat rate is made and community distribution is made without regard to the quantity or the distance carried in delivery There are commodities, however, of considerable weight and bulk, where there is a "yard," "wharf" or "terminal" price, such as coal, lumber, building materials, and in some instances prices are made at the warehouse, but these are not generally known. With coal the custom is to make a "yard" price and a regular delivery charge is made within a specified zone. Beyond this there may be other zones and different prices. Considering other commodities, such as inmher.

there is a vard price for large purchases and delivery is included in the prices established.

This works out something like this: The customer pays in addition to the initial charge whatever the estimated cost of delivery may This deltyery price may be large, in the event of no competition: It may be small



The G. M. C. 3.5-Ton Truck in the Service of the William Curtis & Suns Company, Lumber

because of competitive seiling. There is no actual basis by which a charge is made with weight and distance as the determining factors, and beyond all this is the fact that the hanlage expense to the sellers is always different. Undoubtedly there is no standard for delivery expense. Much depends upon the administration and methods and whether the service may he regarded as high class or otherwise. It is not an extreme to state that this variance may be as much as 20 per cent. In some cases. So instead of paying a price that will yield a reasonable margin of profit on the actual expense the customer may, through competition, force the

seller to deliver to him at what is actually a loss.

There is another factor that may as well be considered. Assume a lumber dealer in a large city. He has a trade that may be extended a considerable distance, but in increasing the territory he would serve he finds that the cost of delivery is correspondingly increased, and that he is in competition with others who may have their shipments differently made, and the initial cost may be greater, but this is offset by the lessened delivery expense. There is, then, a point where it is not profitable for the dealer to seek business unless he can economize in his delivery. Obviously the long haul is the most productive because of the minimizing of lost time of the vehicle and the men attending it. but there is at the other hand the unproductive mileage. which cannot be made productive unless through taking up work of another or dissimilar character, which is hardly to he considered

It is apparent enough that the cost of delivery can only be decreased by increasing the loads and the time required to haul them, and by minimizing the time of loading and unloading. In this statement it will be noted that animal When another form of vehicle is employed the estimate of horse delivery is unchanged and the method or system of delivery is varied but little, as a rule. This is because the attention that should be given to haulage Is not given, and because it is assumed that superior speed and capacity will be productive of economy, when as a matter of fact these qualities are not realized hecause no change is made in the method of service.

There are numerous instances of business men having a desire to better their delivery taking a single motor vehicle and utiliting this with their animal service, and making more or less experimentation with a view of determining the relative cost of the two forms of transports. While there is the somewhat uncertain expense of the horses at the one hand, it must be admitted that proportionately a number of service wagons could be more economically maintained than one. Not only this, but with increased experience that there ought to be better service at a relatively leasened cost.

A number of decidedly interesting trials of G. M. C. trucks are now heing made in Boston by firms that are en-



G, M, C, Five-Ton Truck Serving the Suburban Contomers of P. M, Leavitt & Co., Boston, Being Driven at Least 50 Miles Unity to Deliver Seven Tons of Sugar.

delivery in the measure by which any other form is Judged. But with rare exceptions there is no actual knowledge by which horse cost is established. This does not mean that hashess men are not possessed of intelligence, but it does mean that hashing expense was or is seldom kept; that is stead of real figures of each business a rough approximation has been reached; that the assumed standard may be related by the control of
In fact it may be said that most of the business men can only guess at horse delivery cost. But even the most carefully prepared statements are of no real value unless they deal specifically with the businesses they are applied to, because in no other way can exact knowledge be obtained. Then there is the estimate of horse delivery cost that might be applied to a coal husiness, for instance, regarded as the comparative measure for a wholesale grocery firm, or yier versa. Obviously this is all twong. gaged in differing lines of haulage, and of these four are with machines of 7000 pounds capacity, and another la with a 10,000-pound track. These vehicles are all of the Reliance type, which name has been supplanted by that of G. M. C., and have been in service for differing periods of time, from eight months to two years, while there is another use of two tracks which appear to be ploneers in a service that has seemingly large possibilities. In connection with the work performed by these machines it will be necessary to state conditions under which they are used, and also feats relating to haulage generally in Boston.

First of all there is a generally accepted standard of \$6 as the daily cost of hirling a team of average horses, a cart or heavy wagon and a driver. That is to say, there are contractors who will furnish the outift stated for the price given, and assumedly this means with a reasonable profit. However, this is accepted as the probable basis of haulage. The cost of a four-horse team would be at least \$8 a day, and perhaps more. The hird truck and team would no doubt be worked to the limit, which might be regarded as from 16 to 18 miles a day. The single purpose is to obtain.

all that is possible for the money, and means that there is hardly the consideration for the animals that would be manifested were they the property of the concern hiring them. It is reasonable to assume that maximum haulage is secured so far as is possible with the methods the voxue. Were each delivery wagon loaded but once each day and sent to its destination, as far as the haul could be made, this would be ideal but with the frequent short hauls a large part of the time is taken up in loading and unloading and in traffic delays, so the mileage is considerably reduced when averaged.

With two of these examples it should be said that there is the "yard price" for material, the one being lumber and the other masons' materials, to which is added the estimates for the cost of delivery. Two others deal with extended delivery service, and two others with the special work to which attention has been directed.

Of these the husiness of William Curits & Sons Cominary, 30 Eurls street, Roxhury, may be said to have had the most experience with a truck, as it has used a 3.3-ton Reliance machine for rather more than, two years. This concern sells lumber of all kinds and it has in its service about a dozen two-horse teams and the usual carts and lumiended that it shall be carried. The truck is backed to the "wagon" and under the end of the load of lumber, the truck being slightly lower than the other. With the lever the forward roil is turned and the load is transferred to the truck, it moving easily on the roils from the one deek to the other. Despite the weight the load can be taken on the truck in two or three miliarts, and then the chains are tightened and the truck is ready for the road. Since the original countruction the Iron roils save that at the rear have heen removed from the truck deek, because of the say of the end of the load, and maple roilers have been used that may be placed wherever they may be used to the best advantage.

When the load is delivered the truck is backed to the place where the lumber is to be deposited and with the ratchet lever it is drawn hackward and dropped to the ground or onto horses or other supports. Then the machine can be driven back to the yard and the process repeared, so long as there is room available for this manner of unloading. Just what proportion of the unloading with the means described is practicable is not stated. The company has kept a reasonably accurate record of the services realized from the truck, but it is not prepared to make these



Three and a Half-Ton G. M. C. Truck Making the Long Distance Belivery of Starrett, Fields Company, Railding Materials, Hoston, Mass.

her reaches. The motor truck is used for a work where it is expected to yield the best returns—ail the long haudand when it is not so employed it is selected for whatever shalings it is believed to be best adapted. There are limit to the length of stock that can be earlied, but so far as is possible it is usuifized.

The chassis has a platform body or deck with forward side boards and pile stakes. At the rear of the platform is an iron roil carried on brackets so that the upper surface is perhaps two linches above the deck. In the original construction there was a somewhat smaller roil mutted at the middle of the deck on brackets at either side. The middle of the deck on brackets at either side. The rear roil carries a gear and ratchet lever at the left side. On the same side are two cranks and handleds, with ratchets for tithening the chains by which the load is bound to the truck, one at each end of the body. These roils and the ratchets, the levers and the cranks, are all simple and the cost is comparaitely small.

As a means of economizing time of the truck at the yard a "dead wagon" is used. This has a deck equipped with iron rolls and ratchet lever and gear, as is the truck, and on this "wagon" a load is piled exactly as it is inpublic. Other than that the vehicle has been doing good work for the purposes utilized no statement has been made.

The Starrett, Fields Company, on Massachusetts avenue, dealer in masons' materials, chiefly brick, lime and cement, does a husiness with customers scattered all over Boston and its suburbs. The weather is more or iess of a factor in its distribution and under some circumstances deliveries are made daily during the continuance of a job. instead of making delivery as quickly as possible. There are all sorts of conditions governing the distribution and it is not possible to greatly change these. The hauls are all distances within a radius of 25 miles, this distance being the extreme and trips of this length are not often made. It is a fact, however, that deliveries could not be made beyond 10 miles with horses, unless at great expense, but it is churacteristic of the motor vehicle that the longer the haul the more economically it can be made, up to the point when the steam railroad becomes a factor,

This may be demonstrated by instancing one trip made by this truck to Marhiehead Neck with a load of lime, cement and brick, the weight approximating four tons. The run was made by the driver alone and the time was 4.5 hours, including the time taken for unloading the truck. As the brick were handled by hand it can be understood that a half-hour was not too long an estimate. This gave four hours on the road. The longest distance the truck has been driven in any one day is 89 miles, and this included one trip to Andover, Mass., which is approximately 52 miles. The average work of the truck daily is 45 to 50 miles, and during the 19 months it has been used it has been driven close to 27,000 miles. The fuel consumption is about six miles to a gallon and about three pints of cylinder oil are used daily, while about eight quarts of transmission oil are used each month. This gives roughly an idea of the fuel and lubricant expense.

In reference to the work of trucks Mr. Field of this firm says that his observation is that with deliveries within five miles the truck will take the place of two two-horse teams. within 10 miles the place of three two-horse teams, and beyond that radius it will take the place of "any number of horses." It should be remembered, however, that there is no special provision made for josding and that the freight

ton and each morning the drivers load their wagons at the railroad terminal. The sugar is received in bags, boxes and barrels and is loaded as best will serve, because there are no special packages. The foad for two horses is about three tons and for four horses about seven tons.

The drivers have certain customers to serve and are ailowed discretion as to how to make the deliveries in the least time possible. The bags and the boxes may be lifted, but the harreis are handled by skids. Obviously the wagone must be so located when unloading that the work can be done quickly and with the least effort. As delivery is now made a two or four-horse wagon is loaded to make one trip and the load is sent to customers within the distance the team can make without excessive work. This usually takes the entire day, although there are exceptions to this. Last November the company bought a five-ton truck and with it began to serve customers that could not be reached with animal delivery, developing new business

The company has customers served evaluatedly by the truck up to points within 20 miles or thereabout of Boston.

including Abington, which is 21 mlies. Watpole 19 miles. Wakefield 17 miles, and Hingham 17 miles, these distances being roughly estimated and hardly sufficient. The truck, designed for 10,000 bounds capacity, is always started in the morning with a load of 14 .-000 pounds, and this is distributed along the route by the driver and helper, the average work for the day being about 50 miles. Occasignally this mileage is increased but it is seldom as much as 60 miles

The truck was given an exceedingly hard test during last winter because of the severe weather conditions. While it did its work in every way satisfactorily the load it carried was aiways approximately seven tons, the mileage being lessened somewhat in the event of deep snow. The truck in winter is driven in highways that are seldom cleared

where the traffic is not always

sufficient to give anything like the beaten surfaces to be found in the city and town streets.

It is difficult to make comparison of the work that this machine does with animais, because the conditions of operation are entirely different. It has at least three times the daily mileage of any four-horse team, and yet it carries but one load. That is, it is driven three times the distance to make the same distribution, but it is serving customers who could not be reached in any other manner, and at a relatively smaller cost than they could be served by any other form of delivery.

Of course the greater part of the daily trip the load is not greater than the rated capacity of the vehicle, and it is lightened with every delivery, but regarded from the viewpoint of actual service the machine is doing practically as much, if not more, than any other similar vehicle in service in Boston. The fuel consumption averages a gailon approximately 4.5 mlies, which is comparatively low considering the character of work and the load carried.

Another illustration is the work accomplished by the 3.5-ton Reliance truck owned by Macleod Bros., piano and furniture mover, Brookline, Mass. Because of the work engaged in this machine is equipped with an express type



The Three-Ton G. M. C. Truck Making Lengthy Trips for Macteod Bros., Plane and Parate of snow, as in the cities, and ture Mover, Brookline Muse

must be handled at either end by the driver and his heiper, for often two men are sent with the machine. Mr. Field's estimate is made on the basis of horse cost figured at \$6 a day for a team, cart and driver.

The company seils at the "yard prices" and to these is added what may be the estimated delivery expense. Where there are emergency calls and special orders the truck serves a purpose in which expense cannot be computed by the measure already given, for the contractors are often willing to pay an additional price for immediate service, but this kind of work is the exception and not the rule. There is, however, no consideration of the fact that the capacity of the truck is practically the same throughout the year, and that when the horse loads must be reduced because of hot weather or snow, ice or mud, the machine can haui its freight with practically no reduction of capacity and slightly iessened mileage. The truck is used with from 10 to 15 teams of horses and carts.

P. M. Leavitt & Co., 99 Richmond avenue, Boston, is a dealer in sugar, handling Arbuckle products. This concern has about 25 horses in service, and these are used with two and four-horse wagons with which delivery is made. The sugar is received at the New Haven freight houses in Bosbody made especially for the carriage of furniture. The truck was delivered late last autumn and it has been used by the owners in connection with several horse teams and wagons, but doing a class of work that is much different than might be attempted with animals. For that reason it is not practical to make comparison with the use of horses. The truck has been a number of times sent to Providence and Worcester with furniture, and it has made several trips fully 15 miles from Boston, always going out loaded and returning light.

Macleod Bros. has about 50 customers who more from their winter homes to their shore or country residences for the summer, and as the distances are generally considerable the truck was utilized for housing this spring with admirable results permitting the firm to give quicker and better service, and consequently greater satisfaction, because the moving must be done within a comparatively short period. The concern books its time for this work months ahead and as a schedule must be made it is essential that an abead and the set of the truck, trips that could not be made in less than two days are often made in much less than two days are often made in the time, and as the runs are generally straight away, and the hauls long, the speed of the vehicle can be utilized to excellent advantage.

The truck is maintained in the firm's garage, and it is driven and practically all of the work on it is done by the two members of the firm. Naturally, while economy is considered and desired, the machine is given careful attention and kent so as to give the highest efficiency.

Of these four machines, those of William Curtia & Sons Company and P. M. Leavitt & Co., are kept at the service station of the General Motors Company, 944 Massachusetts areaue, and the other two are kept in private garages. Under any circumstances it is not to be assumed that the cost of maintenance is as low as it would he had each owner a number of machines and could have his own garage organization. Whatever work is necessary for efficient upkeep of the trucks is generally done by the service department of the General Motors Company.

When the Curtis truck was first placed in service it was driven by G. D. Fierner, and when the Starrett, Fleids Company's truck was hought Thomas Coolidge was engaged as driver. Eight months ago these men formed a partnership and bought a 3.5-ton G. M. C. truck and began husiness as joinbling truckmen. They found all of the work they could be handle and did well, but Tierney sold his share to his partner at the end of three months and looking about for a machine found the first Reliance truck that was used in Boston, which, after five years' service, much of the time demonstrating, was believed to be ready for the scrap pile. It was in the G. M. C. service sation garage and was not considered of much value. The old two-cycle motor had been replaced by a Continental engine about a year before, and this was considered to be the only valuable part of the vehicle.

Tierney bought the truck, had the broken chassis frame weided, and, doing the work himself, restored it at comparatively small expense. Since that time he has used it constantly, having more work than he and his helper can do, and hesides this has opportunities to make contracts for work for an entire season if he desires them. He is often cailed on to take out special orders for concerns that have their own deliveries, such as the Curtis & Sons Company, the Starrett, Fleids Company, and the like, when they have demands that they cannot take care of with their own equipments. He says that he is doing very well and that he is establishing himself, believing that he has the foundation of a good hussness, and that development is certain.

His method of caring for the truck, which he keeps at the service station of the General Motors Company, is to examine it each day for possible needs of adjustment, to go

over it whenever he has any spare time during the day, and to keep it up to as high a standard as he can. He wants the machine to he always ready for use and if night or Sunday work is necessary it is done. As to his driving, he maintains that there is nothing gained by moving fast over poor streets or roads. He says that he drives as he did with horses, favoring the truck where judgment dictates this should be done, and making time on the good streets and highways. He said that the day he was conversing with the writer he could have saved an hour's time by driving over a short section of very rough ground, but he preferred to unload the truck and carry the freight a short distance himself rather than abuse the machine. He says that he will not carry overloads and that in the event of being in sand or soft ground where very severe work is necessary to move or get out of a hole he will use boards, hrush or whatever will give the driving wheels traction. Mr. Tierney says that the truck is doing just as good work as any machine in the country, that he will do work not many will undertake, that he will do it quite as quickly, and that the vehicle in service is running as well as any.

After purchasing his partner's interest in the 2.5-ton truck and using that machine for a time Coolidge sold it and bought a used Reliance 3.5-ton truck. He is using this in practically the same sort of service and he is getting sat-sfactory results, but it is by no means as old as Tiernery's.

These two men own their trucks, operate them themselves, employ a helper, and find all the work they can do at prices that are satisfactory. The charge for the trucks is about \$2 an hour, according to the nature of the work, and as this includes the services of two men it cannot be regarded as excessive, but very often work is undertaken for a joh price, and this cannot be estimated by the hour hasis. Johhing haulage has been carried on with animals for years, but men engaged in this kind of work would seem to regard the ownership of a truck as something quite heyond them. The experience of these two men would seem to indicate there are ahundant opportunities for energetic drivers to establish themselves, and to secure constant and desirable patronage from firms that are willing to pay for whatever special service they need, rather than have delivery that might at any time not he utilized to its full capacity.

AUTOMATIC STARTING DEVICE.

I. N. Heebner, superintendent of the fire alarm system in South Manchester, N. H., as well as being foreman of Hose and Ladder Company I, has conceived a device whereby the engines in the automobile chemical and automobile hook and ladder, which the company recently ordered, will start automatically every time an alarm in received at the hose house.

The invention will necessitate the attachment of a small motor to both engines, and these will be connected with the fire alarm box so that when the alarm is rung in the motor will start and this will in turn start the engines. The connection between the apparatus and alarm box will be so arranged that when the automobiles leave the headquarters the connections will break. The details of the device have not been worked out sufficiently to warrant Mr. Hechher in making them public as yet. He will give it every test before it is placed on the market, but that is his luttimate desire.

The new apparatus, which has been ordered from the Seagrave Company of Columbia, O., is to be delivered in the near future. Both machines will be equipped with 80 horsepower engines, and the hook and indder truck, because of its length, will have a tiller to atter the rear wheels. The two motor driven vehicles will cost the city of Manchester approximately \$12,000.

BOSTON TRUCK SHOW DATES.

Hand in hand with arrangements for the pleasure vehicle show in Boston, March 8-15, 1913, pians are being made for a motor truck show, March 19-26. The subject was discussed at a recent meeting of the Boston Commercial Motor Vehicle Dealers' Association, when dates were decided upon, and other details outlined. Another meeting will be called in the fail when more definite steps will be taken regarding show trains, decorations and assignment of hooths.

SHANKS AGENT FOR KELLY.

Charles B, Shanks of San Francisco, Cal., has taken a position as general factory representative for the Kelly Motor Truck Company, Springfield, O., in California, Oregon, Washington, Idabo, Montana, Nevada, Utah, Arizona, New Nexico and the Hawalian islanda. Branch quarters are to be established in San Francisco in a building 200 hy 200 feet at Fourth and Harrison streety.

In the other sales centres in the territory, Shanks will establish and supervise agencies which will have the active



Perfect Car in Service with the Nater iterating tumpus) at Lon Angaria, Cal.

Scooperation of a competent factory mechanical staff. Reallising that the sale of motor trucks depends in a large measure that the
use on real factory service in matters of skilled mechanic
and a complete stock of duplicate parts, the Kelly company
is to equit open of its agreeless in such manner that delaw.

LEE TIRES IN MAIL COLLECTION.

in making repairs will be reduced to a minimum.

In the fall of 1909 the postmaster at Philadelphia decleded to experiment with commercial cars in the collection of mail throughout the city. Four Autocsrs, made by the Autocar Company, Ardmore, Penh., were placed in service and these have given excellent satisfaction. The four cars replaced 20 horse wagons and 40 men. The tree caulpment is of special interest, these 1500-pound wagons being fitted ail around with Lee puncture proof 34 by five-inch penciutate shoes made by the Lee Tire & Rubber Company Conshohockee, Penn. The puncture proof feature has been particularly satisfactory, in view of the Beed for constant service, eight hours a day.

AGENT FOR LOCOMOBILE TRUCKS.

A. M. Pearson has closed negotiations with the Locomobile Company of America, Bridgeport, Conn., to handle its five-ton truck in Philadelphia, Baltimore and Washinzton. Mr. Pearson is well known in the moot truck world, having at times been consected with the White Company, Cireveland, O., and the Gramm Motor Truck Company, Lima, O. The Locomobile company has met with remarkable success in the introduction of its latest product.

Speaking of truck conditions in Philadelphia, Mr. Pearson says: "I have always maintained that Philadelphia is the greatest truck field in the United States. The principal reasons for this are the extraordinarily large area covered by Philadelphia proper and the number of small towns surrounding the city."

PEERLESS IN BREWERY DELIVERY.

An accompanying illustration presents a Peerless truck, made by the Peerless Motor Car Company, Cleveland, O., and in service with the Maier Brewing Company in Los Angeles, Cal. The well known efficiency and economy of these

vehicles has been ably demonstrated by this installation, and the car has travelled scores of miles over the city streets and roads in that immediate vicinity.

One of the particular features, which has had a bearing on the situation is the matter of weight indistribution. As in all Percitarities, 80 per cent, of the load is carried on the read driving wheels, making it possible to utilize light, seeks and a single possible to utilize light in front. These are held to preserve the mechanism from the descriptive joins that would not be dissibled in another manner.

Careful examination of the photograph will reveal a little dog, Fritz, seated on the bood. Perhaps Fritz may be regarded as truck. He occupies this particular truck. He occupies this position throughout the entire day's work. Before the arrival of the Peerless, be was in the habit of following one

of the horse teams, and seems to have realized in no small measure that the mechanical transport is eventually to replace the animal equipment,

G. M. C. DELIVERS ASPHALT.

Detroit has been using a G. M. C. truck, equipped with a special mechanical dumping body, made by the General Motors Truck Company of that city, in laying asphalt during the past few weeks. The experiments with the machine have proved that the unloading not only can be accomplished more quickly, but the rapidity with which deliveries are made enables the workmen to spread the material while hot, thereby improving the surface of the pavement. Recently work was done 3.2 miles from the asphalt plant. The truck made a trip every 55 minutes, carrying five tons of asphalt, sufficient to spread over an area of 70 square yards. Eight trips a day were made, 42 tons of asphalt being delivered. The daily distance covered was over 50 miles. With horses, aside from the other disadvantages, each team could make only three trips a day, delivering a total of nine tons of the material.

THE FEDERAL ONE-TON TRUCK.

THE Federal Motor Truck Company, Detroit, Mich., produces a single type of vehicle, this being of one ton capacity, the chassis being suited for differing body installations. The policy of the company is that in the production of but one machine, and every endeavor directed toward the perfection of this, there are numerous advantages from the viewpoints of manufacturer and user. To illustrate: The factory equipment was installed with the purpose of concentration on the machine, this specialization reducing the manufacturing cost materially and permitting undivided attention toward the development of the vehicle.

It is held by the officials of the company that the design was decided upon after it had been carefully experimented and every desired quality had been obtained. The preliminary work was with a view of determining every fault and when every practical requirement had been established and every element had been found equal to the service for which such a wagon is adapted, production was begun. In other words, instead of similar work with several designs and the necessity of costly machine equipment for each, no matter bow many were built, it was believed that there was a sufficient demand to justify the one-ton wagon and to standthe need of economical upkeep and maintenance. It is maintained by the company that by limiting the design to one vehicle and producing in large numbers the highest ideal is reached in manufacturing, and this economy makes possible the marketing of a machine that is not only superior, but relatively cheaper, than that constructed under other conditions.

The settling policy of the company is to economise distribution so far as this may be done and to not only convince the business man that motor delivery is practical, but to make clear that the main proposition for him to deal with is what form of equipment will afford him the most efficient and satisfactory service. The machines are placed in the market with a guarantee for one year, but this guarantee ceases with breaking of the sensi placed on the governor of the engine when the vehicle is finally inspected and shipped from the factory.

The Federal wagons are made with two types of chassis, the model C being 110 inches wheelbase, and the model D 144 inches wheelbase, the difference being in the louger chassis frame of the latter. The model C is intended for carrying smaller freights of comparatively heavy commodi-



Federal Truck Equipped as Wrecker and Fire Attending Apparatus by the Refer United Railway, Carrying Jacks, Tools and Hose Jumpers Weighing 2100 Pounds,

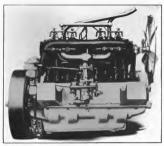
ardize this, improving it whenever exhaustive experiment had proven that this was practicable.

In considering the possibilities of the market for motor vehicles it was decided that the greater number used are of comparatively small capacities and that these are utilized for a great number of purposes. What was essential was mobility that would permit rapid delivery, smiletent loading capacity to take a full freight of light but builty commodities, and construction that would endure under all reasonable road conditions. Of course there is a limitation as to speed that is practical when the road surfaces are considered, and yet there must be ample power for use over poor highways. The chief value of a motor delivery is its capacity to carry a load as rapidly as circumstances will permit, and to return as quickly as is possible, because time must be allowed for loading and unloading, and the economy of time must be while on the road.

In a construction intended to perform such service as has been stated there must be careful attention to design, because of the extreme work that must be accomplished, and there must be an ample factor of safety with relation to each component of the entire assembly. Not only this, there must be interchangeability of parts, and it is equally desirable that these be as low in cost as is roundstent because of ties, and the model D is designed for the loads of bulkter articles. For these chasis two sizes of body are fitted as standard installation when such equipment is desired, the model C stake hody having a deek 101 inches length and 62 inches width, and the model D stake hody a deek length of 144 inches and 62 inches width. The express body of the model C is 101 inches length and 46 inches width, and the same type of body for the model D chasis is 126 inches length and 46 inches width. The stake bodies have respective deek arreas of 43.25 and 42 square feet, and the express bodies areas of 32.25 and 49.25 square feet, recycliment because the chasis may be bount; that is best suited for a specific purpose, and this permits choice that is not nossible where there is a sincle size.

The Federal service wagon is a substantial construction but one of the reasons for its endurance and seed is the fact that it is so constructed that it may be driven to its timit without excessive attress upon the mechanism. The chassis has abundant power, the motor being rated at 28.9 by the S. A. E. standard which is a horsepower much larger than is found in vehicles of considerably greater load cannot be supported by the contractive of the substantial contractive.

The motor is of the I, head type with the valves at the



Right, or Camshaft, Side of the 28.9 Horsepower Motor of the Federal Truck.

right side, the bore being 4.25 by 4.5 Inches. The cytinders are cast in pairs, the units being of a fine quality of gray iron, with the water Jackets integral. The water Jackets are large and are formed to afford a free circulation of the cooling fluid. The bosses for the compression relief and priming cocks are located in the centre of each cylinder and the large exhaust header is retained to the cylinder units by heavy boits anchored in the sides of the castings. The base flanges of the units are very heavy and are reinforced by substantial hosses for the bolts retaining them to the crankeess.

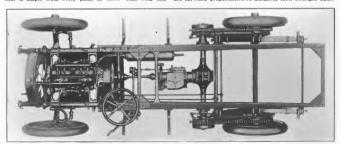
The cylinder castings are carefully cleaned of the cores and are then bored and reamed, and after ageing are ground to size. The pistons are cast of the same material as the cylinders and are turned and accurately fitted by grinding being channeled for four rings. The rings are ground on the edges and the peripheries so that the compression is nositive.

The engine case is aluminum, divided longitudinally, the upper section having very large arms cast integral, he being cored for lightness and having unusual supporting area. The outer sections of these four arms are despited to fit in to the chassis frame, affording a bearing surface that is ample from every point of view. Cast with the

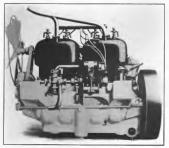
section is the bracket at the left side that supports the magneto. The forward end of the upper half is extended beyond the forward end web and this extension houses the timing gears, a plate bolted to the housing covering theshafts and gearing. The lower half of the case is cast with a weh above the bottom, in which are the channels for the swing of the connecting rods, these forming the pits in which the jubricant is accumulated. The shape of the section is such that the channels appear in the sides and theeffect is a strength that might ordinarily be secured through bridge work. Below the web is the nil reservoir which is. slightly deeper at the rear, so that there is a drainage tothe rear of the case, and two large inspection openings, one at the extreme rear of the left side and the other at the bottom on the same side permit easy cleaning of the reservoir. The upper section carries the main bearings and the lowerhalf may be removed without disturbing these should it be necessary to work on the crankshaft or connecting rod bear-

The crankshaft is a special alloy steel drop forging and its carefully heat treated and ground to size, the shaft and crankpins being of large diameter. The shaft is installed on three unusually long bearings of die cast metal, these being adjustable with shims, carried in the end and centre webs of the case. The crankshaft and the hearings are designed with a view of endurance under severe and continuous service. The connecting rods are is section steel drop forgings of large size, and these are fitted to the crankpins with heavy caps securely bothed, with shims for adjustment for wear. The small ends are fitted to the wristpins, the plant of the continuous cont

The camahaft is at the right side of the motor and it is a special sized, drop forged, with the rams integrt, of livre proportions and is mounted on three long hearings. This shaft is heat treated and hardened and the cama are carrefully ground to size. The timing gears are of special sized and have wide faces, heigh constructed to endure hard service. The valve ports are large and have wide and have necessaries that is sufficient to linure complete scavening of the cylinders of the products of combustion, and to take in full charges of right gas. The valves are with cast iron heads electrically welful to stems of nicked steel. The valve stems are fitted in long bushings that may be renewed when worn and the springs are carefully proportioned to maintain their strength under



Top View of the Chassis of the Federal One-Ton Truck, Showing Chassis Complete Without the Mudguards, Ranning Heards, Holy or Hood.



Left, or Pump and Magneto, Side of the Power Plant of the Pederal Chamis.

the high temperature of operation. They are held between beary coliars and are retained by keys. The tappets are of ample size and are ground to an accurate fit. They are operated in guides installed in boases on the base flarge of the cylinder units and are equipped with hardened adjusting accrease and must be compensate for were.

The right camshaft drives the oil pump and the motor governor and the left timing gear actuates the outside countershaft that carries the fan helt pulley, and operates the water pump and the magneto.

The motor is lubricated by a splash system from constant levels in the base of the engine case. The pump is located at the extreme rear of the case at the right side and is driven by bevig gears. The links is at the lowest point of the oil reservoir attached to the hostom of the engine case and it is surrounded by a filter. The oil is drawn by the pump and carried through ducts to the compartment above the reservoir and there distributed to the channels or pits beneath the crashplas into which the ends of the connecting rods sweep. These channels are filled and

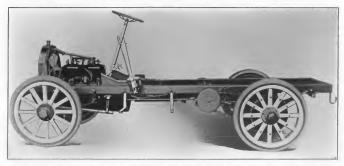
the excess oil is drained to the reservoir to be filtered and used again. The spiash lubricates the crankshaft and the camehaft and their bearings, the connecting rods, the wristpins, the wristpin bearings, the cylinder and piston walls, the valve tappets and the timing general

The engine is cooled by a circulation of water through the large water jackets. The water is passed through a large radiator of the vertical tube type by a pump of the centrifugal form at the left of the motor. The injet pipe passes between the cylinder units and unites with a manifold that is connected with each pair of cylinders at the base of the exhaust valves. The water encircles the lacket and then passes out of the outlet manifold, there being a single lead from the centre of each cylinder casting that unites with a straight flow into the top of the radiator. Ati curves are easy and there is a rapid circulation of the water when the engine is in operation. The radiation is promoted by a large six-bladed fan mounted on a bracket attached to the forward cylinder unit. This has an eccentric adjustment so that the beit tension may be maintained constantly. The fan is driven by a flat beit from a pulley mounted on the left countershaft

The radiator is mounted with each of its side supports carried between two helical springs so that there are no ostresses upon it from chassis distortion or from road shock. These springs are carried on a guide rod fixed in a bracket installed on the chassis frame.

The ignition is by an Elsemann high-tension magnetowith a fixed spark, this heira regarded as being the most antisfactory for a service vehicle as it eliminates all possibility of mistake in adjustment, and as it is set at the factory at the point where the most satisfactory operation is secured it is not possible for the driver to abuse the engine. Under the beaviest kind of work the engine will gradually siacken its motion until it is necessary to change to a lower speed, but it will not be possible for a changed ignition point to overwork it. This form of installation simplifies the wiring and lessens the care and attention necessary. The four leads from the magneto distributor are carried to a duct mounted on top of the cylinders and thence to the spark plugs.

The carburetion is by an automatic carburetor of a float feed type, with independent adjustments for high and low speed, and is effective at all conditions of operation.



Side View of the Federal One-Ton Chanda Shawn in the Preceding Illustration, Giving a Thorough Presentation of Construction and Proportions.

It is equipped with a dust cap and the gasoline level is permanently fixed so that it cannot be made inoperative through ignorance. It is provided with the combination



Federal Selective Gearnet and Jackshaft Partly Disassembled to

hot air and starting device. There is a short riser to the large manifold, that has a wide sweep to each of the cylinder units. The carthretor is controlled by a governor that is installed at the rear of the motor at the right side, and this is set at the factory so that the motor cannot exceed 1009 revolutions a minute and it will not permit a speed greater than 15 miles an hour. The governor is positive in its action and is wholly independent of the regular control. The working parts of the governor are wholly enclosed and do not require more attention than oiling. There is is no hand throttie, the gas control being by foot accelerator only.

The accessibility of the motor through simply raising the hood is one of the strongest recommendations made for it.

The clutch is a leather faced cone of 16 linches diameter that is carried on a shaft mounted in a heavy gross frame member. The cone facing covers six auxiliary springs that insure case of engagement and prevent all joints and jars under any condition of service. Two universal joints couple the driving shaft with the clutch and the transmission shafts, the forward end of the transmission case being carried by a cross frame member, and the rear end heing bother as siding generated in a siding generate construction baving three forward speech and reverse. The gears are large and have faces 1.5 inches which have faced the shafts of nickel steel are carried on Hyatt high duty bearings throughout. The gears and shafts are heat treated to insure the greatest strength.

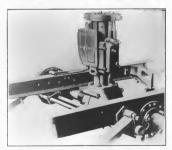
The gearset case is carried on a single support forward and the jackshaft housing is suspended in the frame with a flexible mounting, affording a three point suspension. Both the gearcase and the jackshaft are easily removable, either separate or as a unit, and they may be assembled on a bench during an overhaul and instaited in the frame as an assembly. The frame brackets that carry the jackshaft are horseshoe shaped with the opening downward and are counterhored to receive the jackshaft housing brackets. By removing the retaining screws and sliding the housing brackets out a short distance from the frame the rear of the transmission-jackshaft assembly may be dropped clear of the frame. It is then removed from the chassis by drawing the assembly back far enough to disengage the universal mounting at the forward end. The design is such that the gearset casing may be removed from above or below without disturbing the jackshaft, chains, sprockets or radius rods. As will be noted from the lliustration the jackshaft is mounted with heavy roller bearings and on the outer ends of the driving shafts are the sprockets and the service brake drums. The jackshaft housing is assembled with a series of large boits retaining the differential case, there being jarge grease cups to afford lubrication. The gearset case may he examined by the removal of the inspection plate covering the shafts and gears.

The drive from the jackshaft to the rear wheels is hy side chains and sprockets, the driving stresses being taken by the radius rods. These rods differ from conventional constructions in that they consist of four parts. The first is the hub brake centre that is mounted on the axle proper and turns upon the axle. To this is attached by a heavy hinge the radius rod or member, so that the rod may be swung from side to side. This rod is connected with a member that is holted so as to encircle the tubular jackshaft housing by a threaded member. Any movement of the radius rod causes no strains, as either end will turn on the axie or jackshaft, and the hinge will compensate for side swing. There is a fitted bearing between the axle and the hub brake centre, which excludes dust or dirt and wear is minimized. As the radius rod and chain centres are the same the chain tension is uniform. The driving effort is always exerted from the rear axle to the jackshaft housing and the braking never unduly strains the springs or jackshaft,

Chassis frame is a cold pressed 20 point carbon steel channel section. 21875 linkt thickness with a width of 4.5 inches and a depth channel of from 1.75 to 3.5 inches, at the forward end—the point of greatest atress. The frame is strongly reinforced by the cross members and supports and the large gusset plates. A ginnee at the litustration of the chassis, too ylew, will make clear the construction.

The frame is suspended on semi-climite springs, the forward set being 45 inches length and 2.55 inches width, and the rear springs 44 inches length and 2.55 inches width. The front atte is a drop forzed steel I section 2.75 inches deep and two inches width, with heavy yokes, wheel pivots and spindles. Rear atte is a steel drop forzing two inches square. Both axies are equipped with Timken roller bearings and on these revolve wheel 35 inches diameter, built with spokes two inches square. The hub flanges are unusually large and the wheels are decidedly heavier and stronger than the equipment of vehicles of this size. The tirce are 38 by 3.5 inches forward and 35 by four inches

The chassis is with ieft side drive, and the control is exceedingly simplified. The machine is steered by an irreversible gear and an 18-inch hand wheel. There are no



Federal Transmission Case and Jackshaft Trened in Chassis to Show Manuer of Support and Ease of Removal.

hand levers on the steering column. The right pedal operates the service brake, which is of the internal expanding type, within drums 12 inches diameter and 1.5 inches face,

mounted on the outer ends of the jackshaft. This brake is well housed and is not affected by water, dust, mud or lubricants. The left pedal actuates the clutch. The hand



Brake and Radius Rnd Construction of the Federal Chassis, Delating the Axie, Spring Suspension, and Frame Prosections

levers afford the different speed ratios and operate the emergency brake, which is internal expanding within drums 16 inches diameter and two inches face. The brake drum and the rear sprocket are a unit and each is boiled close to the periphery through the spokes of the rear wheel, one bolt to each spoke. A foot accelerator is the only control of the fuel, which is supplied by gravity feed from a tank with 21 gallons capacity. The weight of the model C chassis is 3200 nounds and of the model D chassis 3300 nounds.

Throughout the chassis it may be noted that the design has been with the purpose of obtaining endurance, a quality that is emphasized by the proportions of the components, while there are numerous refinements that economize the time necessary to give the attention essential to effective upkeep. The design affords extreme accessibility, while the details have been carefully thought out. The assembly is attractive and substantial and the vehicles are maintained to be in every way extremely serviceable.

This idea may be conveyed by the first illustration of this article, which is of a chassis used by the Tuited Rail-way of bertoit, Mich., and equipped for carrying a wrecking outfit and hose jumpers for use at fires. The body is distinctive in that the centre of gravity is very low, but the load is unusual in that the outfit at the rear of the body is carried in a flexible cradle. The cradle is suspended from a ceiling and in the event of an airm it is dropped into the rear of the body and the machine is rushed off to the place of the alarm. At other times merely the wrecking tools are carried. The total weight of the cradle and its contents is 2100 pounds, and it is handled by a pneumatic hoist.

Where the Federal vehicles have been demonstrated, they have been found particularly reliable, this result being proven in the Chicago-Detroit-Chicago service wagon reliability contest last August, and in the Glidden tour last Octoher, when a Federal went through both competitions and endured service that was considered in every way extreme.

PASSENGER SERVICE IN TEXAS.

The Texas & Pactile Railroad Company, In connection with the Weatherford, Mineral Wells & Northwestern Railway Company recently commenced the operation of a motor car service between Dailas and Mineral Wells, Tex., a distance of 86 miles. The cars will make two round trips a day, leaving Dailas at 9 in the morning and 4:10 in the afternoon, making the run to Mineral Wells in three hours. This plan is of interest, particularly to people leaving New Orleans on the limited at 1:30 in the afternoon and arriving in Dailas the next morning at 7:20, as it will provide immediate connections for them, by means of motor cars, so that they can reach Mineral Wells in time for lunch. It is stated that motor car service will later be established between a number of other points on the Texas & Pacific.

MACHINES FOR WATER DEPARTMENT.

At a recent meeting of the water department commissioners of the city of Springfield, Mans, it was voted to add two more motor vehicles to the equipment of the department. One will be a runahout to take the place of Supt. Martins car, which is being transformed into a delivery wagon, and the other will be a truck of three tons capacity, for use in transferring men and heavy plping to various points about the city.

MILK DELIVERY WITH PIERCE-ARROW.

A Pierce-Arrow five-ton truck, made by the Pierce-Arrow Motor Car Company, Buffalo, N. Y., was installed a few weeks ago hy a Detroit creamery concern, and the use to which it has been put has long since proved its efficiency. The machine sees 21 hours' service every day with the exception of Sundays, when it is used but 12 hours. At 3 every morning the truck is driven from the garage and until 1 in the afternoon is busy delivering cream and milk in bottles and cans to stores and restaurants. While delivering, the crew is also engaged in gathering empties from the day before. Starting at 1, two trips and return to railway stations are made, each time with five tons of milk. At 2 the second driver goes on duty. He makes trips to various branches of the concern and to rallway stations, the truck covering between 50 and 60 miles a day. The work done by the vehicle formerly required eight two-horse wagons and a single team.

AUTOCAR FOR ASHES COLLECTION.

The Massachusetts Institute of Technoloxy, Boston. Mass., recently commenced the use of a truck, fitted with a special body, made by the Autocar Company, Ardmore, Penn., for collecting ashes, the car being fitted with an end-dumpling device. In dumping, the forward end of the wagon is elevated by a chain field operated by a hand crankwheel. The statechment for loading consists of a line crane with block and fall. A large ash harrle is easily lifted into the wagon and empited by use of the crane. The frame of the body is pressed steel, and the chassis has a capacity of



The Simplified Control of the Federal Machines, with Left Drive and But Two Pedals and Two Levers.

about 3000 pounds. The driver's seat is over the motor so as to give a maximum body platform with a minimum-wheelbase. The maximum speed is 20 miles an hour.

NEWS OF THE COMMERCIAL VEHICLE INDUSTRY.

National Association Laying Plans for Increased Show Circuit in 1912—Interesting Agricultural Contest for Canada—Many Concerns Enlarging Production Facilities.

The National Association of Automobile Manufacturers at a recent meeting in New York City decided upon a schedule for no less than 12 shows during the winter of 1913. Although the matter of fruck shows is not taken into consideration in the framing of the circuit, wherever a separate truck show is given, as in New York, it may follow the pleasure are show. The special show chassis and other factory exhibits that the manufacturers supply for the pleasure car shows have few corresponding parallels so far as relates to commercial vehicles, stock 'machines usually beling sufficient.

The proposed schedule of circuit show dates awards the opening exhibition to Cleveland, Jan, 6-11. It is considered that the plan will do away with a duplication of dates, give the manufacturers a continuous run of shows, minimize traveiling and transportation rates, and give the makers every opportunity to co-operate with the dealers in arranging exhibitions and advertising. In other words, everyone connected with the husiness will know just what to expect and how to arrange accordingly. Following Cleveland, the shows will be: New York, Jan. 11-18; Pibliadelphia, Jan. 20-25; Detroit, Jan. 27-Peh. 1; Chicago, Peh. 1-8; Minneapolis, Peh. 10-15; Knana City, Peb. 17-22; St. Louis, Feb. 24-March 1; Pittsburg, March 3-8; Boston, March 3-15; Buffalo, Narch 17-22; Indianapolis, Narch 24-29.

All the dates, with the exception of those awarded to the plitshure, are definite, those in the case of the Pennsylvania city being left in abeyance until the association is able to ascertain whether rival trade organizations in that city are disposed to combine. A committee of deniers is to confere with the Motor & Accessory Manufacturers to secure from the latter organization the necessary sanctions that all the shows on the list, instead of heing limited to New York and Chiego.

OHIO TRUCK MAKERS COMBINE.

The Cleveland Motor Truck Company of Cleveland, O. and the Howard Automobile Company of Gallon, in the same state, both of which have manufactured trucks on a limited scale, have amalgamated under the title of the Cleveland-Gallon Truck Company, It is the intention of the officers of the new concern, which is capitalized for \$3.00,.000, to conduct a progressive campaign of expansion. Harry W. Woodward, who was president of the Cleveland company, is at the head of the new corporation. Offices will be retained in Cleveland, and the factorica will be located as Gallon.

NEW PACKARD MODEL.

The Packard Motor Car Company, Detroit, has placed a fire-ton truck on the market, the addition of the nex type rounding out the company's output of heavy duty vehicles. The new model is like the three-ton Packard except that it has a more powerful motor and is of heavier construction throughout. The machine has been introduced after 19.006 miles of testing, under conditions that would not be encountered in the ordinary use of a motor driven service car.

The motor is of 40 horsepower, S. A. E. rating, with a bore of five inches and a stroke of 5.5 inches. The wheelbase of the standard chassis in 14 feet long, but there are optional sizes giving frame in eight behind the drives giving frame seat from 12 to 16 feet. There are standard and optional and bodies adapted to meet a wide range of requirements to to lonare a long life to the vehicle, there is an automatic severence limiting the need to 8.2 miles an our.

MERGER IN LOS ANGELES.

The Durocar Manufacturing Company and the Amalgamated Motor Company, both of Los Anneles, Cal., were recently merged into a \$1,000,000 concern. The manufacture of automobiles, including a medium priced truck, on a larger scale han ever before, will be commenced at Albamhra, Cal., within a short time. The firm name of the new concern will be the Durocar Manufacturing Company and the officers will be as follows: President, W. M. Varney; vice president, J. B. Teagraden; secretary, P. G. Stone; treasurer, J. E. Peters. Beatdes the officers the board of directors will include W. M. Northrup, F. W. Patten, O. P. Eastey, J. D. McLeod, O. G. Myron, S. A. Bullis, E. U. Hickman, Douglins White, O. R. Rule and L. E. Parker,

GOODYEAR TRUCK TIRE PLANT.

The rapid advancement of the motor truck business in the past few months has led the Goodyear Tire & Russellon Company, Akron, O., to take steps to immediately increase its facilities for manufacturing truck tires. According to C. W. Martin, Jr., sales manager of the department, the output will be 1000 tires a day.

"Orders already have been placed," says Mr. Martin, "for additional equipment for the manufacture of all types of tires. The motor truck husiness is increasing wonder-tully, and the tire output is an excellent harometer of coming of the truck into commercial life and the passing of the horse."

LANGE MOTOR COMPANY FORMED.

One of the latest additions to the motor truck manufacturing industry is the H. Lange Wagon Compan, Pittsburz, Penn. This firm, for many years one of the best known carriage making concerns in the country, has formed a subsidiary, to be known as the Lange Notor Company. The headquarters of the new organization are to be in Pittsburz, where a factory hulding, with about 49,000 square feet of floor space, has been erected and machinery installed. Trucks of one and two-ton capacities will be the only types manufactured at first.

TO MAKE CENTURY ELECTRIC.

The Century Electric Cur Company has been formed in betroit, a plant will be erected and the manufacture of cars, both of the pleasure and commercial types, will start as soon as possible. The company has been capitalized for \$100,000, and the following officers have heen elected: President, John Wyan, Jr.; vice president, Charles L Weeks; secretary and treasurer, Edward Atkins; general manager, John B, Gillespie; additional directors, William A, Jackson, Philip Dreitmeyer and Howard Streiter.

INTERNATIONAL MOTOR PLOWING CONTEST.

An agricultural motor competition will be held in connection with the Canadian industrial exhibition at Winnipeg, Manitoba, July 16-20, this event being open to the makers of the world. Two classifications are announced, one being in the nature of a fuel economy test and the other a gang plow context.

in the first, five sub-divisions will be made, as follows: A: Gaoline engines with platon displacement of 300 cubic of 120 Gaoline engines of 300 cubic feet a minute and under; (b) gaoline engines of 300-500 feet a minute; (c) gaoline engines of 300-500 cubic feet a minute; (d) kerosene engines under 500 cubic feet an minute, and (e) kerosene engines under 500 cubic feet on minute. Provision also will be made for steam engines of over 500 cubic feet an minute, Provision also will be made for steam engines. The tests will include brake test, ploying and such other test, ploying and such other test, ploying and such other by the exhibition association as at sulpulsted feet registed by the exhibition association as at sulpulsted feet registed.

In the plowing competition, two sub-divisions will be made: (a) Engine plow with six bottoms and under, and (b) engine plow with more than six bottoms. The test will consist of one round of the plowing field, or longer if deemed necessary by the judges. The contestants may employ any kind of engine they wish. The depth of the plowing must be uniform and as directed by the judges. Each plow must cut full width. A recording dynamometer will be placed between the engine and the plow, and this will accurately record the pull.

In connection with the plowing test the quality of the plowing, which is to be judged by prominent agriculturists, shall have special reference to: Evenness of depth of furness of furnow and finish at the ends. In connection with the evenness of the furnow, the exact depth prescribed by the judges must be maintained throughout the test. The number of furnows opened at the commencement must be carried through to the end of the test.

The directors in charge of this department are as follows: F. J. C. Coxe, chairman; Hon, George Lawrence, J. H. Parkhill, Hon, D. C. Cameron, G. F. Galt, Prof. W. J. Mitchell, Mayor Wangb, C. W. Sharp, and Aidermen Shore, Crowe and Gray. The associate directors are: J. H. J. Murphy, L. C. Mclatyre, J. Clarke and W. F. Fuller. Arthur C. Frith is engineer and A. W. Bell manager.

NEW PLANT IN OKLAHOMA.

W. E. Nation is one of the latest to enter the automoble manufacturing field. He will establish a factory at Okiahoma City, Okia, and will place medium priced pleasure and commercial cars on the market. A building, which will have 12,000 square feet of floor space, is in process of construction. The initial cost of the plant will be \$3.00.

SUMMER SHOW NEXT YEAR.

The number of 1913 is very likely to see a commercial vehicle exhibition and demonstration under the assigners of the National Association of Automobile Manufacturers on a scale covering a wider range than was ever attempted before in the display of motor trucks. There is the possibility that the exhibition may take the place of winter shows as now held, this being a matter for which the opinion of the trade will be canvassed. The subject was discussed at considerable length at a meeting of the executive committee, preceding sessions of the N. A. A. M. in New York a short time ago, and many of the manufacturers looked upon the proposition with considerable enthusiasm. At present the matter is being considered by the show and

commercial vehicle committees, their decision being awaited with interest.

TO BUILD NEW PLANT.

Fred I. Siebert, motor truck and carriage manufacturer, 523-525 Quatrio street, Toldoo, O., has been granted a permit by the building inspection department of his bome city to build a \$10,000 three-story brick building in Southard avenue. The building will be \$118\$ feet long and 75 feet wide.

WITH BUFFALO ELECTRIC COMPANY.

Howard E. Wagner, until recently sales manager for Wyckoff, Church & Partridge, Inc., New York City, has been appointed in a similar capacity with the newly organized Buffaio Electric Vehicle Company, Buffaio, N. Y. Hoe egan his new duties June 15, and will make his beadquarters in Buffaio.

Mr. Wagner's association with the industry dates from

1904, when he had charge of the selling of Pope Waverley electrics at Indianapolis, Ind. From 1906 to 1908 he managed the sales department of the Babcock electric carriage business conducted by Wyckoff, Church & Partridge, and from 1908 to 1910 he was branch manager of the Babcock Electric Carriage Company in New York City. In the latter year he became sales manager for Wyckoff, Church & Partridge, Inc.



The Buffalo Elec-Howard E, Wagner, Sales Manager, Buffalo Electric Vehicle Company,

tric Vehicle Company.

Buffalo Electric Vehicle Company.

Is a consolidation of various electric concerns in Buffalo, N.

I, Included among which is the maker of the Bubcock electric evhicles. It is announced, as well, that the reorganized firm will enter the market with electrically propelled buggare trucks and other commercial vehicles. Extensive plana are under way for a far reaching campaign of manufacturing and publicity, with branch bouses in Rochester, Chicago and Cleveland. Still other branches will be located in other sections of the country, under Mr. Wagner's guidance.

NEW TRUCK FROM SPRINGFIELD.

The Springfield Metal Body Company, Springfield, Mass, and the lirigitive of Manufacturing Company recently consultated under the name of the Nayasett Motor Company. The capital stock is 12,000,000. The new company will continue the manufacture of the Orson car, formerly made by the Brightwood company, and it is also planned to manufacture the S. P. A. Trucks, which have been imported by the S. P. A. Import Company. The Smith brothers, formerly prominent with the Springfield company, are to be identified with the new concern.

ANOTHER TRUCK FROM DETROIT.

Detroit's latest commercial vehicle is the Wolverinebetroit, made by the Pratt, Carter, Sigabee Company. An accompanying illustration presents one of these cars on the recent 703-mile run of the Wolverine Automobile Clish from Detroit to Indianapolis and return. It will be noted that the roads were not always of the hest, but the little 806pound wagon made the trip, carrying an overload and travelling with the pleasure car tourists throughout the entire journey.

The Wolverine-Detroit is fitted with a single-cylinder, four-cycle, water-cooled motor, with bore of 4.5, finches and stroke of 5.5. Cooling is by the thermo-sphon system, lubrication by constant level splaab, ignition by jump spark with coil and multiple dry battery, and carburetion by a float feed subcommate type vaporter, with a single gasoline adjuatment. Drive is by friction discs. The tires are 32 by 3.5-inch poeumatics.

Throughout the trip mentioned, the car carried a load of 1105 pounds, at an average speed of 17 to 18 miles an

the erection of a large modern concrete factory plant. Among recent orders received by the company was one for 100 trucks to be delivered in New York City and another for a slipment of solid tire surries to be sent to Uruguay. South America

LOZIER TRUCKS NEXT WINTER.

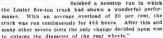
Following an exhibition of a five-ton Lozier truck at practically all the hig show last witter, manufactures throughout the country naturally expected the Lozier Motor Company, Detroit, to place the machine on the market this year, and at the time such was the intention of the company. It is now announced that deliveries will be delayed until next winter, President H. A. Lozier making the following statement:

"We have been actively engaged in the manufacture of motor trucks, but for the past three years we have been doing extensive experimenting in this line and have devel-

oped a five-ton truck which was assemblied at the larger shows last winter. At the time the truck was shown to the public it was our plan to manufacture 200 vehicles of this type, the first to be delivered about May 15. The remarkable increase in our couring acrousiness, however, taxed our factory to the utmost and we found it would be utterly insposible to begin the manufacture of trucks on the date scheduled.

"Our dealers everywhere were ankous for definite delivery dates, and because of the demand made upon our factory by the increased touring car business we were compelled to announce to our dealers that it would be impossible to make delivery of trucks before next winter. This was naturally a great disappointment to the dealers as well as ourselves, because we had at that time the

cause we had at that time just finished a nonstop run in which





Wolverine-Detroit Light Delivery Car Acting as Buggage Wagon on Recent Cross Country Tour,

hour. An average gasoline consumption of 26 miles to the gallon was recorded. Four men accompanied the vehicle, these being W. C. Pratt, H. C. Carter, N. J. Fleming and G. E. Buckley.

KREBS ORGANIZATION COMPLETED.

The final organization of the Krebs Commercial Car Company, Clyde, O., was effected recently and officers have heen elected as follows: President, B. A. Becker; vice president, George Sirssman; secretary, Homer Metger; treasurer, Robert B. Jones; general manager, J. I. C. Krebs. All of these officers were formerly associated with the Elmore Manufacturing Company of Clyde, maker of piessure cars. The new concern will produce, exclusively at first, a 150e-pound truck of the two-yilnder type.

NEW PLANT FOR KEARNS COMPANY.

In order to care for its increasing business, the Kearns Motor Car Company, Beavertown, Penn., has selected a site for a new building, and work will be commenced at once on

PENN UNIT COMPANY ORGANIZED.

James K, Bowen of Allentown, Penn., has incorporated the Penn Unit Manufacturing Company to manufacture commercial motor vehicles. The company has a capitalization of \$50,000. S. Bruce Somervell, formerly with the American Marion Sales Company, will take charge of the sales, and will have an office at 108 Fullon street, New York City. A d-monstratilg truck is already at the sales offices and, has created considerable interest. It was driven from Allentown to Jersey City in 5.15:200.

The Knox Automobile Company, Springfield, Mass., recently received the award of a contract to supply the city of Altoona, Penn., with a combination chemical wagon.

BUILDING SPECIAL MOTOR TRUCK BODIES.

Manufacturing Equipment to Meet the Requirements of Different Delivery Service Has Been Developed as an Industry That Decidedly Benefits the Owner.

ONE, need but observe the innumerable types of service wagon body equipment, to understand that there is, as a rule, at least a reason for the design and construction. Were the owner consulted it would be found, unless the vehicle had been built for another, that this reason justified the building of the particular body under consideration. That there are bundreds of styles is not too broad a statement. That there are special creations, produced to have a distinct advertising value, is apparent, but these are not to be considered, for they would be utterly valueless to another. They serve, however, an impirations for others of a

It is essential that the equipment be made of material and so constructed that it will yield the character of service expected from a motor vehicle inataliation.

Because of many reasons service wagon body construction has become a recognised industry. It has just as distinct a place with relation to highway vehicle building as has chassis manufacture, and the production of equipment that is absolutely correct is even more necessary because of the conditions that govers the use of chassis. Not only this, makers of truck and wagon chassis found that to meet the different requirements of prospective purchassers.



The Plant of the Motor Truck Body Company: A, Section of the Assembling Department, Third Floor: B, Milling Hivision of the Factory; C, the Front of the Building; D, Gilmpse at the Assembling of the Bodiest E, In the Painting and Plaishing Shop.

character that may be similarly utilized in business.

The enormous demand for motor vehicles is insided principally by a purpose to economize. That is, in theory, at less; and each purchaser seeks what will secure for him the capacity and other desired qualities. It might be possible to select a hody that would be more or less useful and be particularly adapted for certain uses, but this could not be used with equality good results for a number of purposes. As the qualities that impet the purchase of a service wagon are its superior speed and capacity, it is essential that the body be chosen with reference for the particular work that it is to be used for.

Pirst of all, if speed is to be made, it is necessary that refight be properly loaded and packed, with a view to carrying the load as the charsis is designed to carry it. Next it is imperative that the body have space that will be suffcient, yet what will not permit overloading. Beyond this It would be necessary to maintain hody building plants, involving the Investment of large amounts of money and the maintenance of coasily equipment and forces of high class and experienced employers, with no assurance that such factories would be productive, because of the uncertainty of demand. It was found that each order differed from an other, requiring special work and attention, so that viewed from a practical viewpoint it was better to have the bodies hullt by men selected by the purchasers. In other words, making bodies that differ devidedy is not a work that can be done with success an a department of a chassis factory. It is feasible to produce one position, but a constraint hundreds, each to its separate specification, is an industry in every was waivante and nant from stork body making.

Obviously the special built body is more costly than one of a type of which hundreds are made and the different

styles standardized. This must be realized by the purchaser, but it must be understood that unless the specially designed body is used there will be dissatisfaction and failure to obtain the fullest service of the vehicle.

Viewed practically it will be clear that the chassis owner wants the fullest return for his investment. He cannot afford to take chances. He cannot be served to the best advantage by the chassis maker, and the difference in cent between the stock and the special body is such that there is false economy in accepting what is not wanted because it might be cheaper, and it is certainly not what can be utilized to the best advantage. Hesides this, many of the buyers prefer to have the hodies constructed where they can augertise the work, which cannot well be done unless one is located close to the chassis factory. Again the chassis hullders prefer to be relieved of a responsibility that is

it is evident that the obligation of the chassis manufacturer is limited to his guarantee and the only inducement for him to build bodies would be to insure the instaistrongly manifested as the industry is developed.

The construction of service wagon bodies has been recognized as ofering to energete and progressive men unusual opportunities, and a considerable number of enterprises of this character have been established. These concerns have entered the field with, as a rule, realization that success is proportionate to the work that can be produced; that in this, as in all industries, economy of production and excellence of workmanship and design are imperative; that it is necessary to study each requirement and create and develop what will best serve each demand, and that there is possible a promotion of motor vehicle use by intelligent co-overation with the buyers and users of chasile.

It is natural enough that especial attention should be devoted to body building in and about Detroit, which is the largest mechanical vehicle producing city in the world. The location is admirable for co-operation with different truck chassis manufacturers of that city and vicinity, and to have available every detail of necessary information and the assistance of the designers and engineers. One of the largest



Bods for Furniture Delivery Built to the Order of the C. F. Manus Company, Spracuse, N. Y.

lation of equipment that would permit proper loading, but as this detail is quite as carefully considered by the special body huilder there is nothing to be gained in this respect.

There are today about 150 different makes of service wagons in the market, and these range from one to a dozen chassis types. On any one of these chassis may be installed one of perhaps 25 different types of hodies, and so it will he seen that the manufacturer who produced three sizes of chassis might have a demand for any one of several hundred bodies, and be prepared to construct any of these to order. or to make modifications to meet requirements. Prepared for stock production, he was not willing to specialize. Then came the policy of selling the chassis, the purchaser to provide the body he wanted, made to his specifications hy a local body maker. This is the selling plan that is followed today. There are two influences-the disposition of the manufacturers of the chassis, and the demand of the buyers -that have established the body building industry. There is every reason to believe that these will be more and more and best equipped plants in the country devoted exclusively to designing and building bodies for motor trucks is the Motor Truck Body Company of that city.

This concern has been established since the first of the year and has aiready produced bodies that are used in probably three acore different industries. The services of the company's experts are demanded daily by business men who have found their knowledge and advice of decided assistance in dealing with all manner of haulige problems. The company is receiving specifications from customers in New York, Boston, St. Louis, Atlanta, Chicago, New Orleans, Denver and San Francisco, as well as many other cities, which demonstrates how widely spread is the business, and how dependable the company is rated by hustness men.

It is claimed that tests have been made with standard forms of bodies and the new types, and that in every instance for investigation the special construction has more nearly served the needs and requirements of the owners: that in many instances the results with these types were greater efficiency and with savings in operating costs that were appreciable. Not only this, it is held that there was a considerable saving in cost when compared with the special work of a chassis builder.

It is natural enough that an establishment of this character received the approval and the recommendation for business of every truck builder in Detroit and vicinity, this because it made it possible for their local customers to receive personal attention, and from the fact that their representatives in other sections of the country could assure their customers of satisfactory equipment, adapted for any work.

The executives of the Motor Truck Body Company are practical men, who have had large experience, and have, the practical men, who have had large experience, and have, which is observed that sound engineering, akilled workmanship and high class material can produce. The president of the concern, class material can produce. The president of the concern, of the designing of truck bodies for the Packard Motor Cor Company. Elimer of truck bodies for the Packard Motor Cor Company. Elimer had charge of the truck body accounting department of the Packard John Cor Cor Company and the production of the production of the production of the packard point of the production of the production of the production of the production of the packard point, and the factory and production manager.

edge of the chassis decided on, the body is designed, it being adapted to the chassis and to the husiness needs. Horse vehicles are not in any way considered,

An Instance in point is the body for the Cleveland branch of the Packard Motor Car Company for the Cleveland & Sandusky Brewing Company of Cleveland, O. The equipment is on a three-ton Packard chassis. As may be noted in the Illustration it can be loaded at either side by the removal of a centre panel, or from the rear. The body in adapted to brewery haulage or to general delivery purposes, it may be used in narrow streets or drives, is especially convenient for loading or utionding, and does not obstract the horsestated for the complete control of the computer of the

Another illustration is the body built for the three-ton. Packard chassis owned by the C. F. Adam Company, Syracuse, N. Y. This is intended for the delivery of furniture and for use in all weather conditions. The cab is ample for the crew and It can be entirely enclosed, as is shown. The large express type body has high sides and is fitted with large side panels and a standing awaing or top frame, supported from the side panels forward and the two rear stanchions. Four stakes are fitted at either side. The panels, stanchions and stakes are provided with series of pins by which a large load, piled high, can be securely



l'intform flody Constructed for Special Work of Purker, Webb & Co., Detroit, Mich.

Harry Carrier, for several years built the Packard truck bodies.

In designing bodies Mr. Proctor has originally and as his experience has been with the wagon and carriage trade as well, he has produced types that are practical and sightly and are essentially adapted for the service required. Mr. Hangssefer has established a cost system that insures to the purchaser the exact value for the job—not an approximation or an average. He had charge of cost estimating at the Packard factory and figures to exactness. The employees have all had training in power wagon factories and are regarded as expert working.

In the engineering department of the factory are filed blue prints and specifications of nearly all the standard motor track chassis in the market, and these files are kept to date, ready for lantant reference. As building motor track bodier makes imperative complete knowledge of chassis design and construction, by the study of this information new types are thought out and created.

When an order is placed with the company the designers carefully consider the customer's requirements, discuss his particular needs, the conditions of delivery and haulage, operating costs, etc. With this information, and knowlroped. The load can then he protected by the tarpusilin cover, which is kept from contact with it by the frame. When not in use the side stakes may be removed. The provision for securing the load means a considerable saving of time in loading and unloading.

An adaptation of a platform body for the general haulage of a packing house is illustrated by the equipment for the chassis of Parker, Webb & Co., Detroit, this having a rear rack to retain the load when it is piled high. This body is utilized with a targanglia or similar cover.

The company has turned its attention toward the production of bodies adapted for municipal service requirements, and its designing force is developing a new form of body for a police patrol, to be mounted on a light chassis with large motor, that will be instantly convertible into an emergency ambulance, and still earry its crew of patrolmen without discomfort to them. Designs are now making for a combination fire department squad wagon that will have some entirely new features in fire apparatus equipment. This body will be mounted on a high powered pleasure car chassis. Another design now developing in that of a payas-you-enter aight-seeding 'bits, with capacity for about 30 passengers, which will have a speed of 15 miles an hour.

The seating arrangement will follow the idea of the Pullman cars and the windows will open and close in a manner similar to those of the pay-apou-enter trolley cars. The driver will be seated outside of the car body. The body is to be mounted on a three-ton truck chassis and it is expected to be especially adapted for sight-seeing and passenger service in marks. Dessure reservit and to subthrain points.

Of course in the production of work of this character it is necessary that the plant have ample facilities, and the factory of the Notor Track Body Company is complete, so that the hody may be produced in every detail, beginning with the rough lumber and ending with the handsomely finished and decorated equipment, including tops, curtains, and the like. All the mill work, assembline, hiscksmithing, painting, lettering and decorating is done in the shops, which occupy a large huilding in the centre of the automobile building industries of the city. The machine tools are new and of the latest types, among them heing cut-off saws, band saws, rip saws, mortisers, jointers, planers, sanders, and smillar laker swing machines.

One of the factors in the general efficiency of the factory and its economy of production is the blacksmithing facilities. It is usual to have a single shop where this work is done, but instead of this in the assembling departments on the second and third floors are several forces, and that pearest vided so as to render them adaptable for purposes desired. As a matter of fact the body building expert can be of much service to the truck chassis manufacturer because he can, by studying the haulage proliems, develop the use of service wagons to their fullest value, and accomplish a creative work that could not be undertaken by the selling organizations save at great expense and decided loss of time. Not only this, the advice of the hold desligence will be of especial value in that it will be accepted by the chassis manufacturers as founded on sound principles and hauness requirements, and it will have weight in the future perfection of all forms of highway transmitted.

The organizations that are now established and working in this new industry will be the leaders and will have no small part in the real development of haulage economy, in which there are almost unlimited possibilities.

KELLY COMPANY ENTERTAINS.

By invitation of the Kelly Motor Truck Company of Springfield, O., nearly 30 fire chiefs and members of municipal bodies from various sections of Ohlo, western Pennsylvania and West Virginia were its guests recently. Trial runs and demonstrations of a new combination bose and



Brewery Body Designed for the Cleveland & Sandusky Brewing Company of Cleveland, O.

to the joh is utilized, so that there is a saving of time of the workmen, a considerable item when the jobs are numerous. This is one of the economies that is a decided saving for the customer.

The hody panels are made from kiln dried poplar, the stakes are of hickory, the stringers of kiln dried oak and the floor boards of similarly cured ash. The materials are of the highest quality, and carefully dried and seasoned so that when the hody has been in use it will not check. The equipment is constructed to endure and tops are of A1 oiled duck. The work is performed by men who are experts in their lines. All joints are leaded and every screwhead is countersuak. The finishing is made with equal care, and the work is given a uniform attention from the draughting room to the final decoration.

The specialized skill of this concern is available to the chasis maker and his customer, and there are possibilities for the utilization of differing chassis because of the attention devoted to development of hodden that will in every way meet the requirements of the husiness men. It is apparent that the assistance that can be given the purchasers help the hody expert is a considerable factor in promoting the use of moor trucks, and the result is realized by the chassis builders, who can have their vehicles serve when they would not seem satisfactory unless hoddes were pro-

chemical were witnessed, numerous parties being taken on runs from one end of the city to the other. The visitors were entertained at luncheon and dinner at one of the leading hotels. Those present were: Chief Lughler, Youngstown, O., president of the International Association of Fire Engineers; Chief Frank J. Connery, New Castle, Penn.; N. R. Hamilton, Youngstown, O.; C. A. Chambers and Chief Fred L. Martin, Chester, W. Va.: W. B. Martin, Steubenville, O.; Chief J. P. Hay, East Palestine, O.; E. W. Connelly, member of council at New Castle, Penn.; Chief Phillips, Wellsville, O.: Chief Roew, Wheeling, W. Va.: W. A. Lyon, C. J. Huhbard, H. Beck, S. J. French and Peter Huntz of Ravenna, O.; T. W. Dixon, president of councils, New Castle: Fred Peace, representing the Gamewell alarm systems; Charles Ansley, Springfield, and A. L. Forschler, mechanician of the Kelly Motor Truck Company,

REO REPLACES HORSES.

The Reo Motor Car Company, Lansing, Mich., recently delivered one of its motor trucks to the Sample Hardware Company at New Castle, Penn. It is the plan of the purchaser to make all its deliveries in the future by motor, and to entirely do away with horse drawn vehicles.

MOTZ TIRES ON GARFORD PATROLS

The first motor drive pairol wazona in New York City were placed in service recently, when three Gaford machines, made by the Garford Company, Elyria, O., were assigned to duty below 14th street, replacing into horse drawn to vehicles. These will be given a reasonable trial, and if found satisfactory it is planned to increase the equipment, of particularly eliminating horses in this service in the metronoition district.

The chassis is the standard Garford public service type, with 40 horsepower motor, four speed transmission, press steel frame and wheelbase of 145 inches. A significant feature of the equipment is the tires, which are Motz cushon, made by the Motz Tire & Rubber Company, Akron, O.

In specifying, Note tires, the police department appears to have had in mind doing away with thre trouble and at the same time operating the cars under conditions producing easy riding qualities. The maker claims that the double notebed treads prevent skidding and distribute the weight to the sides. In addition, it is held that the undercut sides allow free action of the bridges, producing treat sides.

KISSELKAR MAKES RECORD.

A KisselKar three-ton truck, made by the Kissel Motor Car Company, Hartford, Wis., recently made a wonderful record in climbing Mount Hamilton, California, said to be the steepest regularly travelled grade in the United States. The route was from San Jose, at sea level, to the Lick observatory, at an altitude of 4209 feet. The distance covered was 27 miles, in £25:00, and that with the machine loaded 50 per cent. beyond its rated carrying capacity. The first 21 miles were made in three hours. The last seven miles, an accent of 2200 feet, with 365 sharp turns, some of them extremely dangerous, required 2:25:00.

G. M. C. FOR ELECTRIC FARM.

The electric farm is the latest thing. This unique institution is located in the outskirts of Boston, Mass, and is operated by the Boston Edison Company. With the installation, recently, of a two-ton G, M. C, electric truck, made by the General Motors Truck Company, Detpoil, its



Carford Patrol Recently Installed by New York Police Department, Equipped with Mota Cashion Tires, siliency. Each set is guaranteed for 10,000 miles—practitle to the name "Electric Parm" was made

tically two years service.

BAKER SPEAKS IN MONTREAL.

In a Baker, New England manager for the General Vehicle Company, recently delivered an address before the new Montreal Electrical Society in Montreal, Can. He was the first speaker and took for his topic, "The Electrical Vehicle; Its Success and its Future," He illustrated his paper with lastern sides and moving pictures. One of the latter showed the electrical vehicle parade which was held in Boston a short time size.

MAINE TRANSPORTATION SERVICE.

The Maine Transportation Company, authorized to carry passengers and freight by means of motor carriages between the cities of Augusta and Rockland, and elsewhere In the United States and Canada, has been formed at Augusta, Me, the certificate of organization being filed in the department of state the latter part of May. The officers are: President and treasurer, E. M. Leavitt, Winthrop; clerk, Ernest L. McLean.

title to the name "Electric Parm" was made complete. Electricity does everything in this establishment. It cuts the fodder, milks the cows, washes the dishes, pumps the water, churns the hutter and finally takes the product of the farm to the city in an electric truck.

BALL JOINTS FROM FLORIDA.

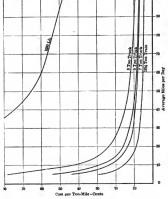
A large plant for the manufacture of patent ball Joints for spark and throttle controls for automobiles will be established in Jacksonville, Plas, soon, the enterprise to be operated by C. W. Birkwood of Chicago, ill. The factory, which will be 30 by 100 feet, is in course of construction. The power used will be obtained from gasoline motors, and automatic machinery is being installed at an approximate coast of \$25,000. The concert has been manufacturing the joints for three years, the change being made to Plorida because of climatic conditions. The product has to be highly tempered in oil, and in Chicago during cold weather the oil is apit to congeat, necessitating extra heating facilities in the plant. This condition, it is thought, will be eliminated in Florids.

COST OF UTILIZING GASOLINE TRUCKS.*

By Louis Ruprecht.

THE graphic charts of actual costs of operation, and cost as ton-mile of work of motor trucks which I present herewith, are merely a tabulation, for convenient reference the present of t

Depreciation is figured at from 10 to 15 per cent., variing according to mileage and the size of the units, the trivalue being deducted from the cost of the complete vehicles. One of the highest priced types of truck is assumed in each case. The depreciation figures are based on experience with hundreds of this type of truck in use over a losg



period of years, in many instances longer than 10 years. It is only fair to say that the depreciation of the newer, more flexible models will be less than that of the older ones.

Drivers' wages on 1000-pound delivery wagons are taken at \$2.75 a 40, and on trucks \$3 to \$4 a day according to size and length of day's work. Helper on trailer is \$1 a day. These figures in the case of a very large day's work might conservatively be figured at trifle higher. Garage charges include only washing and storing of the vehicle; \$240 to \$300 a year according to size. Tire cost is based on prices to user and \$500 miles lite as guaranteed by makers. The sizes figured are all in accordance with the makers are sized to be a size of the size of th

to 125 miles a gailon according to size of vehicle. Insurance, \$100 to \$250 a year according to size. Repairs and replacements have been figured up to three cents a mile in the case of heavy trucks. This is based on extensive records.

Operating days a year have been taken uniformly at 300. This figure is a triffe high, particularly in cases where large daily mileages are made, although it leaves 65 working days and holidays for the upkeep of the equipment.

Attention is now called to the first set of curves showing the actual costs of hauling, expressed in dollars a year, for different sizes of units for varying average daily mileage.

The ordinates indicate the average daily mileage from 10 to 100 and the abacissa the total cost a 300-day year, all charges included. It so happens that on the basis of my fagures the plotted costs are straight lines in every case. This indicates that the total costs increase in constant ratio with the daily mileage. These straight lines if continued to zero miles should indicate theoretically therefore the fixed and other charges against the equipments when idle, and in fact this is approximately the case; for it will be found that costs thus indicated at zero miles are practically the sum total of depreciation, interest, part-time wages, dead storage, insurance, tire depreciation, etc., actually chargeable gaginst a weblete temporarily our of commission.

This situation has suggested to me a convenient thumb rule for figuring costs of operation, making unnecessary the use of this chart, as follows:

Cost a Day = "Fixed Charges" + (Miles a Day × Indiy Increment in Cost.)

Size 1000-1b.	Fixed Charges \$5.07	Increment a Mile \$0,0686
3-ton	5,33	0.0860
5-ton	5.60	0.1253
6-ton	6.00	9.1540
7-ton	6.15	9.1715
125-ton teals	7.40	0.70***

For example, the cost of operating a six-ton truck, all along so included, 45 miles a day, will be \$56 + (1.550 × 55 ± 51.293). Costs a ton-mile can of course he derived similarly without reference to the second set of curves when the present herewith; for these conds have heen derived from the first set of curves.

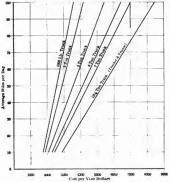
In computing costs a ton-mile it is assumed that vehicles are fully loaded half total daily distance travelled, or, cless are fully loaded half total daily distance travelled, or, what is equivalent, that vehicles carry half their rated capacity load the full distance. If they carry more than this the costs a ton-mile would be correspondingly reduced below the figures of the curres. For instance, for instance, with full loads the the entire distance, the cost a unit of work would be reduced a silmost one-half. I say "function" because depreciation, repairs and renewals and fuel per loaded mile are somewhat screater than nor dead mile.

A study of these curves reveals the large reduction in cost a unit of work hy increasing daily performance as follows:

Incr	easing				
-Dally	Mlieage-	—- н	teduction in	n Cost, Pe	r Cent
From	To	3-ton	5-ton	7-ton	12,5-101.
19	20	4.4	4.4	44	4.4
20	30	25	20	21	20
39	40	17	17	12	11
49	50	1.4	1.4	10	10
50	60	1.0	8	8	9
60	7.0	7	6	4	5
7.0	100	12	8	11	10
40	100	38	32	30	30

In other words, increasing the daily work from 10 miles

^{*}Paper read before summer meeting of Society of Automobile Engineers in Detroit.



dally average to 20 reduces the cost a ton-mile, or unit of work, 44 per cent, in all cases. Then increasing the dally work to 30 miles another reduction of 20 to 25 per cent. In cost a unit of work is effected. And increasing from 30 to 40 miles and y1 1 to 17 per cent. reduction in cost is effected. Substantial gains in economy are made by further increase in daily mileage; increasing from 40 to 100 miles a day, for instance, effects a reduction of 30 to 38 per cent. In cost a unit of work.

These curves are impressive as indicating the economies to be effected by proper routing of vehicles for maximum daily work. The costs, as above mentioned theing hased on loads one way only), can be very materially reduced if merchandise or material can also be carried over some of the "dead mileage" assumed in these computations.

The approximate parallelism of the curves indicates that whether light trucks, heavy trucks, or trucks and trailers are employed, economy increases with increased daily mileage at about the same rate with all these sizes of units.

These curves are also of interest and assistance in studying the question of sizes of units to be used for any particular class of work. They show, for instance, that a 12.5-ton train seven-ton track with 5.5-ton trailer), operating 70 miles a day and loaded only one way, will carry one ton of load one mile for five cents, whereas the same one ton carried one mile in smaller units operating 70 miles a day would cost 10.75 cents on three-ton, eight cents on five-ton and 7.5 cents on seven-ton units; thus indicating the tree-mendous advantage of using large capacity units and frequently trailers wherever large tomage is a variable.

They show also, for instance, that the same economy, viz., 10 cents a ton-mile, is obtained by operating a three-ton truck 84 miles, a five-ton truck 44 miles, a seven-ton truck 35 miles, or a 12.5-ton train only 18 miles a day.

The proper routing of beary transfer units and of lighter distributing units, the adoption of correct sizes of units for such service, or for pure straight baul service, the proper load handling facilities, are all problems which frequently require careful study, always with an eye to the practical conditions of each particular service, to obtain maximum efficiency and economy. Many an installation in the past might have been saved from economic and mechanical failure with more careful study of these conditions, and to bring out the glaring differences in costs a unit of work and to show the possibilities of efficiency study has been the nurpose of this paper.

BUYS POPE-HARTFORD PATROL.

A Pope-Hartford patrol wagon, made by the Pope Manulacturing Company, Hartford, Conn., is to be delivered in Richmond, Va., soon, the purchase being made by the city through the Chesterfield Motor Company. It is planned to eliminate the use of three borse drawn wagons.

SELLS MACK TRUCKS.

The Whitcomb-Carter Company of Beverly, Mass., bas been doing an exceptional business recently in the sails of Mack trucks, made by the International Motor Company, New York City, at its plant in Allentown, Penn., motor of driven commercial vehicles having been placed with the Peoples Express Company of Ipswich, McKensic Express. Company of Gloucester, Dunn's Express, Manchester, N. H., and one with the H. P. Woodbury Company of Beverly.

PREDICTS GOOD SEASON.

Manager Charies A. Malley of the Boston branch of the Universal Motor Truck Company recently had a successful rip to Providence, R. I., where he sold Universal three-ton trucks to the Atlantic Mills at Olneyville and the Revere Rubber Company of Providence. Mr. Mailey predicts an unusually eventful season for the motor truck business in New England.

UNITING RUBBER AND STEEL.

The method of uniting perfectly the soft rubber tread with the steel is one of the features of the Goodyear solid demountable tires depicted in the accompanying illustration. The method is the result of all years of experimentation and service by the Goodyear Tire & Rubber Company, Akron, O., and as will be noted in the picture the attachment of the soft rubber tread is through an intermediate stratum of hard rubber which combines with the metal in a manner siling to ferro-correte.

P. W. Litchfield, factory manager of the Goodyser company's plant at Akron, sited Europe in 1996 and made a pany's plant at Akron, sited Europe in 1996 and made a conceived the idea of the hard rubber has end upon his return to this country a series of experiments were conducted which resulted in the present plant of the tree was not to placed on the market until exacting tests had been conducted, all of which he show evilation successfully.



thatilning Goodyear Method of t siting Rubber Trend with Steri Through Means of Hard Rubber,

ACCESSIBILITY A SILENT CRESCENT FEATURE.

O'N's of many interesting features of the Silent Crescent, made in one, two and three tons capacity by the Crescent Motor Truck Company, Middistown, O., is the location of the motor under the season of the motor moder the season of the motor moder that all the season of the motor moder that the season of the motor moder that the season of the motor moder arrangement of the front seat which is divided and so constructed that hoth portions may be pulled out and swungs to the eart, the operation involving hut a few seconds, and it is political out by the maker that it may be performed as quickly as unlocking and lifting a hood. It is also claimed of the design that considerably more of the power plant is exposed for inspection, and that it permits of the utilization of a shorter wheelbase by 24 inches, enabling easy turning of the machine in narrow streets.

In the matter of the distribution of the load the maker of the Slioni Crescent states that 65 per cent, is carried on the rear asie and 35 on the front. Throughout the best of material and workmanship are incorporated. A noteworthy feature is the employment of S. A. E. threads and all holts are secured with castellated nuts and cotter pins. Five types of standard hodies are fitted, aithough the company

face and split by a milled process. The wristpins are of seamless steel tubing, machined, hardened and ground, and tested with the scienceope. The diameter is 1.25 inches and the bushings are of a high grade phosphor bronce, machined accurately and to a press fit. The bearings of these members are liberal, being 2.25 inches. The piston displacement is 280.6.

Liberal Sized Bearings.

The connecting rods are drop forced from a high grade steel. The upper end is split and the pin is retained in position by a clamping boll, lock washer and nuts. Both the connecting rod and crankshaft bearings are made from a special Hoyr's alloy nickel babbilit, die cast, and have large oil grooves and heavy flanges. Five bearings are utilized for the crankshaft, the inside members heing 2.125 inches while those at the flywheel and front end are 2.75 and 3.3375 inches, respectively. The crankshaft is 1.625 inches in diameter, is drop forged from 40 point carbon manganese steel, heat treated and halanced with and without the flywheel. The latter is 16.825 inches in diameter with a 4.875inch face. The cambaft is drop forged, heat treated, car-

fully machined and case hardened. The integral cams are ground accurately from master members. The bearings are ample, of phosphor bronze, and are split in the centre for adjustment.

The timing gears of the crankshaft are drop forged from 40 point carbon steel, heat treated, while camebaft scare are cast of semi-steel. Both have helical cut teeth which assures quiet operation, as well as enduring qualities, The valves are ample in size, being two inches in diameter, of a high grade steel and both the Intake and exhaust members are located on the left hand side of the motor. A feature of the valve operating mechanism is the design of the vaive lifting arrangement. These components are constructed

Constructional Features
Power Ptant.

curate fit and freedom from noise. A long steel guide

curate fit and freedom from noise. A long steel guide is utilized, this eliminating side slap as well as making for a more satisfactory operating motor, as the valves smat properly and do not require frequent grinding. All valves are adjustable.

The exhaust and litake manifolds are located on the left hand side and are of liberal size and clean castings. Pipes are counterbored in each opening, as also are the cylinders, and a straight inliple is used in this counterbore. Copper ashestos gaskets are fitted between the cylinders and and the pipes, and the latter are drawn up by tlebars on liberal stude, preventing auxiliary air or gas leaks. The water manifold is located on the right of the motor, of tapered brass tubing with cast fianges and these are attached to the cylinders by liberal stude,

Cooling and Lubrication.

The water pump is of atandard brass gear design, on the right hand side of the engine, driven direct from the front end of the camshaft, and is fitted with extra lone packing nuts, insuring a water tight member. It maintains positive pressure of water in all cylinders, with an even temperature of the fluid, and makes for efficiency of the motor.



The Silent Crencent One-Tun Truck, Presenting Many Interesting Constructional Features
Including Swinging Scale Permitting Easy Access to Power Plant.

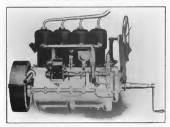
is prepared to furnish special members according to the requirements of the purchaser. The guarantee is unusually broad, covering a period of two years.

Rutenber Motor Employed.

The motor employed in the one-ton model described and illinatrated berein, as the well known Rustenber, designed especially for truck service. The cylinders are of the L head type can separately of semi-steel, and a high grade material is utilized. These are cast from metal patierns on modding machines, insuring uniform thickness and water lacket spaces free from obstructions. Each cylinder is annealed to equalize all strains in casting, after which it is rough hored and tested under bydraulic pressure. After being seasoned properly, it is inspected and finished by internal grinding with water flowing through the water jackets during the process, insuring accurate results. The bore is 4.125 inches and stroke 4.25, giving a rated horse-power of 30 at 1000 revolutions a minute.

The pistoms are cast of the same material as the cylinders and undergo the same treatment in finishins. The rings are of a tough, springy cast iron and alloy and are perfectly ground on the sides and outside. These are fitted accurately to the platon, lapped to obtain a smooth sur-

The oiling system of the Rutenber motor is well designed, the tubricant being maintained at a constant level at all times eliminating flooding of the working parts and



Presenting the Magneto Side of Ratenber Motor Fitted to the Silent Crescent Tracks.

smoking. The lubricant is circulated by a positive gear pump driven from the lower end of the commutator shaft, and being aubmerged in oil wear is reduced to a minimum. The lubricant is forced into the connecting rod pits, and there maintained at a proper level, the overflow being led to the lower reservoir. All oil is strained through a wire mesh before it enters the reservoir, which contains two gallons. The oil sight feed is located on the pump side, enabling the operator to note at a glance the amount of lubricant in the container.

The crankcases are made of a high grade aluminum, scraped and finished in natural color. They are well ribbed, and the tower half contains a separate compartment, cast integral, which is the oil reservoir. The oil pan may be removed easily by displacing cap screws at the centre line of

the crankcase, this arrangement making for an easy inspection or adjustment of the hearings, etc. This also eliminates the necessity of removing the power plant from the frame.

A Werner riveted tube radiator is utilized, it being suspended by a spring device which absorbs road shocks. The filler cap is ample in size and very accessible. Cooling is assisted by a fan located on a swivel bracket, and a spring device is fitted for the purpose of maintaining tengion. The construction is such that it may be removed easily.

A Remy magneto is the standard equipment although a Bosch or an Eisemann is furnished when desired. A model L Schebler carburetor is employed.

(Jutch and Transmission.

The cone clutch is a taper cone and springs are utilized between member and friction band, these being adjustable. It is claimed of this arrangement that easy engage-

and that the transmission is relieved of stresses in starting.

universal coupling of rugged design. it is of the block tin type, with hardened and ground parts, and accurately fitted to prevent ratting. The square shaft construction is climinated, the coupling being bolted to flanges keyed on shafts.

A selective sliding gear transmission, providing three speeds forward and a reverse, is employed and this is a unit with the jackshaft. A three point suspension is a feature. this arrangement relieving the parts of stresses encountered when traversing rough and uneven roads. The transmission gears are of cbrome nickel steel tempered in oil and thoroughly tested and inspected before being assembled. They have ample sized teeth which are formed by the process of planing, making for durability, as well as quict operation. All gears and bearings operate in a bath of lubricant and are very accessible.

The jackshaft is of a high grade material and of ample size and its driving aurockets have 14, 17 or 19 teeth, respectively, and are interchangeable, the combination meeting the requirements of different service. The standard equipment, however, is 18 teeth. The rear sprockets have 44 teeth and these members are also accessible and interchangeable. Final drive is by roller chains, these being .625 inch wide, 1.25 inches pitch and with .75 inch wide rollers.

Ample Brakes Provided.

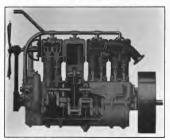
Particular attention has been paid to the matter of brakes, an important factor in the operation of the industrial transport. The Liggett type service brakes are fitted to the rear wheels, operated by pedal, and the utilization of a well designed equalizer insures even pressure at both members. The hrakes are 12 inches in diameter with threeinch face. The emergency members are Duplex fitted to the jackshaft and actuated by lever convenient to the driver. These are eight inches in diameter with two-inch face. The total braking surface is 300 square inches.

The front axie is of the I beam section type with bowed centre, and the apindles and knuckles are of liberal size. The adjustable tierod is located in the rear of this member, protecting it from road obstructions. The reach rod is also



Depicting How Senta Are Swang to the Rear, the Operation Requiring But a Few Secon-an Arrangement Making the Inspection of the Motor on Easy Task,

ment of the clutch is possible, that slipping is eliminated sturdy in design. The rear axle is 2.25 by 3.5 inches with 2.125-inch diameter wheel spindles. The wheels are of the interposed between the clutch and the transmission is a artiliery type, of carefully selected and seasoned wood, the front members having 12 two-inch spokes and the rear 14 two-inch spokes. Bower roller bearings are liberally employed. Solid single rubber tires are fitted, 34 by 3.5



Cross Section View of Mojor Outlining Its Components and Oiling System.

inches, to both the front and rear wheels,

The company makes use of a full elliptic spring, both front and rear, belleving that this design makes an cess riding vehicle and relieves the chassis components from stresses. The front members are 24 by two inches and the rear 40 by two. An auxiliary cross, semi-elliptic spring is utilized at the rear, this being 40 by 2.5 inches. The springs are of a high grade material, carefully tempered and the total spring surfaces in 336 times inches.

The wheelbase is 108 inches with tread standard, 56 inches. The frame is of five-inch channel with truss roots on the one and two-ton models while six-inch is utilized on the three-ton-vehicle. The net weight of the chassis is 300 pounds and the body carrying capacity back of the driver's eat is 48 inches wide and 108 inches long, or 60 by 108.

Control is by a lever centrally located. The emergency brake lever and service brake pedal are at the right of driver while the clutch pedal and differential lock are at the left. The latter is incorporated in the Jackshaff unit and by it the axies may be locked, farilitating traction when the machine is operating in sand or on muddy roads. The spark and throttle levers are mounted under the 18-inch handwheel.

Motor Very Accessible.

Mention has been made as to the accessibility feature of the power plant. Two individual front seats move on tubing and are directly over the motor. This tubing permits of the seats to be pulled out 24 inches and by means of a hinge arrangement they may be swung hackward and out of the way of the driver when an inspection of the power plant is desired. The seats when in normal position fit together accurately and are securely locked by a simple device. The maker points out that the operation may be completed as quickly as the unfastening of and lifting of the motor increase.

Another feature of the Silent Creacent is the design of the radius roots. These members are very substantial and are hinged to the rear axie. Adjustment or alignment of the axie had colatin is made possible by large boils, which are threaded into an extension of the jackshaft housing and locked. Throughout, all parts of the chassis subject to friction are provided with liberal sized grease cups. In its design the company has given attention to the refinement of small details and all components of the chassis are notices. able for their accessibility and ease of adjustment,

The regular equipment comprises two side oil lamps, tall light, horn and a complete set of tools. One or two search-lights and a Prest-O-life tank are listed extra. Regarding special bodies, the company manufacturers any type at an increase of 10 per cent. over the cost of material and labor. The chassis includes the driver's cah which is equipped with atorm front and a feature of the design is the mounting of the fuel tank over the radiator. This tank is of the rivered type, of substantial material and its provided with a liberat filling opening, facilitating the replenishing of the supply. Other Models.

The two-ton model is also equipped with a Ratenber motor, rated at 35 horsepower and has a wheelbase of 126 inches with 60-inch trend. Solid single tires are employed in front, 34 by four Inches, with dual at rear, 34 by 5.3 inches. The Rutenber motor of the three-ton Machine is rated at 40 horsepower, and the car has single solid tires in front, 36 by 8ve inches, and dual 36 by four inches at rear. The wheelbase is 136 inches and tread 62. Other components of the chassis of the two and three-ton models are strengthened to meet the requirements of a heavier load.

GEORGIA LEADS THE SOUTH.

The federal bureau of statistics, a short time ago, reported that Georgia led the southern states in building of good roads, and now comes an equally interesting amountement that the state has twice as many automobiles as any of its southern esighbors. There are 14,000 motor vehicles in the state, 7000 in Tennessee, 4000 in Alabama (two mouths ago), 2000 in Arkansas, 3000 in Florida, 4000 in Kentucky, 4000 in North Carolina, 4300 in Virginia and 2000 in Mississipiol.

MORE MOTORS FOR NEWCASTLE.

Newcastle, Penn., is to add several pieces of motor drawn apparatus to its fire fighting equipment. Automobile engines have given such satisfaction in that city that it has



Clutch and I niversal Coupling of Silent Crescent, the Letter Bring Boiled to Flanges Keyed to Shafta,

been decided to purchase an automobile for the chief of the department, an automobile truck and combination chemical and hose wagon.

WHITE TRUCK IN GLOUCESTER

in order to facilitate deliveries at Eastern Point and Bass Rocks, (we summer resorts, the Presson Express Company, Gloucester, Mass., recently purchased a White truck, made by the White Company, Cleveland, O. The body was built and the painting done by a Gloucester firm. The truck was one of the first to make its appearance in the town, and the probabilities are that the express company will eventually do away entirely with its horse drawn vehieles

NEW KNOX COAL DUMPER

The Fall River from Works, Fall River, Mass., which, by the way, manufactures cotton cloth, although it was organized as an iron concern many years ago, has just taken delivery of the seven-ton Knox coal dumping truck shown in the accompanying illustration. The car was made by the Knox Automobile Company, Springfield, Mass., and is in some respects a decided departure from previous models produced by this maker

Perhaps it ought to be stated in this connection that the Fait River iron Works began experimenting with Knox trucks about 18 months ago. The

vehicle it has had in service replaced three double teams in the work of hauling completed materials from the factory to the plant of the United States Finishing Company, which takes all the goods manufactured by the Fali River Iron Works.

The distance covered between the two plants is only about .375 mile, necessitating many stops during the day. Something like 14,000 pieces of goods are transported daily, this work being accomplished in 16 or 17 loads. Three men accompany the Knox car, the goods being handled on small trucks, which are wheeled on and off the larger vehicle.

So successful has been the work of this first Knox truck that when it was decided to secure a

larger car for the transportation of coal. The Knox company was furnished with the demands of the work contemplated and the entire construction of the vehicle present-

ed herewith was accomplished in the Springfield factory. it will be noted that although this truck is of seven ions capacity the dumping arrangement is operated by hand, and it is claimed by the company that the mechanism was designed and huit so the windiass would afford a very powerful leverage with minimum friction. The chassis is fitted with a short wheelbase, so that the dumping hody permits a satisfactory balance of the load, thereby facilitating delivery. The hody itself is made of heavy oak panels, strongly reinforced with metal sides on the exterior, and is flared toward the rear to prevent the coal from packing when being dumped.

FIFTEEN G. M. C.'S FOR BOSTON.

The Shepard-Norwell Company of Boston, Mass., one of New England's oldest department stores, will abandon its horse drawn delivery system. Manager Ketcham recently placed an order with the General Motors Truck Company,

Detroit, for 15 1.5-ton gasoline trucks. The firm placed an order for 10 machines at first, deciding to keep a few of its horse drawn vehicles for a time, at least, but further conaideration resulted in an order for an additional five machines before the first had been delivered.

MACK IN WEST VIRGINIA.

The first delivery motor truck to be used by West Virginia merchants was recently put in commission by House & Herrmann, located in Wheeling, it is one of three to be used by the firm in distributing goods in the country, and is a Mack of 2.5-tons capacity, made by the international Motor Company at its plant in Alientown, Penn. Eventually the firms plans to entirely do away with the use of horses, both in the country and city,

PEERLESS FOR COAL DELIVERY.

Delivering 60 tons of coal in 9.5 hours is the record of a Peerless truck, made by the Peerless Motor Car Company, Cieveland, O., in a recent test at Worcester, Mass. The truck had a special body, unloading mechanically without the aid of shovels. The coal was hauled from the yards to



no other make was considered Interesting Coal Damping Body Fitted to Seven-Ton Knox Chassis Recently Delivered is when it was doubted to severe a Fall River, Mass.

the State Hospital and the Worcester Technical School. Speaking of the action of the body one of the Worcester papers said:

"Arriving at the hospital the driver, without leaving his seat, tripped a smail lever and instantly the body started up in the air and simultaneously travelled and titted toward the rear. When the load was out hystanders were astonished to see the truck start immediately on its return with the body still in its unusual position. But they were promptly relieved to discover that while the truck was under way the body was descending. It settled quietly into its piace before the truck had gone 300 feet."

TRUCK IN PLACE OF MULES.

The Home of the Good Shepherd, Wheeling, W. Va., has received a large delivery truck for use in connection with the work of its inundry. The vehicle takes the place of several muje teams, and if found efficient, plans will be made to add a number of others to the equipment of the institution.



AINTS·FOR·PROPER MAINTENANCE

A Department for the Owner, Driver and Repairman.



G. C. HEAVY FUEL VAPORIZER.

The progress of engineers and individuals in developing as practical device which will vaporize kerosene or heavy fuels for utilization with the internal combustion motor is of special literates; to those identified with the commercial vehicle industry. The advantages of such a vaporizer would be more readily appreciated in foreign countries, especially in the tropics where the price of gasoline is pro-hibitive and where kerosene may be considered a boushedd necessity and therefore more readily obtained and at a less cost than the lighter (ut.)

A vaporizer which has been fitted to a number of large trucks in the service of an English company is the G. C., marketed by the British and Coloniai G. C. Syndicate of London. England, and it is stated that it has given satis-

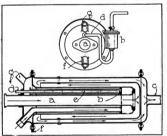


Fig. 1-G, C, Vaporiser for Utilisation of Kerosene and Heavy Fuels, Which Is Simple in Construction,

faction, as well as greater mileage to a given quantity of fuel as compared with gasoline.

It is the invention of a young Roumanian engineer, who through having been associated with the development of the various oil fields in his native land, has been in a position to gain valuable knowledge regarding the nature of mineral oils. The vaporizer, which is depleted at Fig. 1, is constructed in combination with the muffler, and as will be noted by the sectional and elevation drawing, Is simple in design. It may be utilized in place of the muffler if desired.

The heated exhaust games pass from the exhaust pipe into a central pipe a, which is gilled on the outside and has strips of brass accured to it longitudinally. In the sketch these details are not shown. The object of this arrangement is to retain the heat, as well as to maintain that of

the vaporizing chamber b at an even temperature. After the flowing through this chamber the games pass hack along the outside of this member and eventually find egress at the outside. C. The fuel to be vaporized enters at d and conveyed through a long perforated tube e inserted in the vaporizing chamber.

When the motor is operatins, the temperature of this chamber is nated to be maintained at between 500 and 600 degrees Pahrenheit. A certain amount of air is utilized in the vaporization of the tive. The atmosphere enters at a connection I at the end of the vaporizing chamber, and as it is heated it mixes readily with the vaporized oil, forming an explosive mixture which is drawn into the cylinders through the outlet g.

An auxiliary air listed is fitted to the Intake pipe, it being employed to obtain the correct mixture, as well as maximum power. The flow of the tuel is controlled automatically by the speed of the motor through a simple device, this consisting of a vessel h, which is similar to the usual float member and which has a giass gauge for noting the level of the oil. Inside of vessel is a jet, consisting of a piece of .25-inch expere tubing slotted some distance down on each side by a saw cut about .0625 inch wide. An adjustable valve is provided for controlling the flow of the fuel to this feed regulator, and this is set to meet the demands of the motor when the latter is operating at its maximum. Adjustments may be made when the engine is running, the operation being simple, it is stated.

As generally is the case with heavy fuel vaportiers, the G. C, device must be bested to a certain temperature hefore the heavy fuel can he utilized and the motor operate successfully with It. This is accomplished by running the engine upon gasoline for a few minutes, after which the heavy fuel is brought in service. It is stated that outside of one or two backfires or premature expications, caused by the manipulation of the auxiliary valve, the motor will operate successfully with oil.

SPARK PLUG AND VALVE GAUGE.

The lagenlous operator who cares for his truck will construct a number of useful devices from broken and discarded tools which have been consigned to the scrap heap. Old files are converted into bearing scrapers, cotter pin pullers, etc. Broken hacksaw hindes are rarely saved, especially if the pieces he small, hut even these may be turned into useful tools.

At Fig. 2 is outlined how a driver utilized a small piece of an old hacksaw blade. The piece was about 1.5 inches, and its thickness was exactly .03125 inch. This was about the right gap for the spark plug and was employed when setting the points as shown at C. It was also noted by the driver when adjusting the space between valve tappet and stem, the distance was .03125 inch, so the tool served for setting the valves without utilizing the marks placed

upon the flywheel for this purpose by the manufacturer.

As the motor of the truck was fitted with two separate sets of piugs, one being supplied by current from a mag-

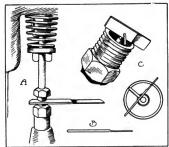


Fig. 2—Home Made Measuring Tool Constructed from a Piece of Hacksaw Blade, and Depicting Some of the Uses to Which It May He Put.

neto, the other end of the hacksaw hlade was ground down to .015625 inch, as indicated at B. The rough ends and teeth were removed by grinding on an emery wheel. The device could be arranged so as to provide a measuring gauge by fastening together two or more of these memhers, which would enable measurements to be made from .015625 up to .125 linch.

CUTTING THREADS ON SMALL SCREWS.

In many shops only long screws are carried and when a short one is desired the threads are cut up to the head and the extra length cut from the thread end. When this is done by holding the ecrew in a vise and using cutters or a hacksaw, considerable filing is necessary to restore the threads to their original condition. The extra work may be eliminated by the following method:

A die the same size as the thread is fastened into the holder and the stock clamped in the view. The screw is threaded into the die, a screw driver being utilized to force it through, cutting the threads on the shank. After cutting off the extra length the screw is backed out, the die forming the threads hack little on shape.

At times the screw will twist when cutting threads on the shank, especially the smaller sizes. This can be prevented by catching the threaded end in the vise after starting the die and holding the head from twisting with a screw driver white the die is being turned.

HOME MADE COMPRESSOR.

Some drivers take pride in maintaining the power plant in first class shape, and upon request like to lift the hood and show the motor with its brass connections highly polished and all exterior parts free from dirt and grease. This means considerable labor unless the work is performed at stated periods. Many operators of commercial vehicless graduate from the ranks of pleasure car drivers and some are very handy in constructing devices for making easy the maintenance of the industrial transport, when placed in charge of trucks.

At Fig. 3 A is depicted a compressor made by a driver

for removing grease and dirt from the chassis. The material was herepantly and some of the parts were secured in the garage. It was constructed by taking a galvanized tank and soldering a tube into it at the top and another at the hottom as outlined. These members were fitted with vaives and joined. The hose was of sufficient length to-permit of the use of the spraying nozale without moving the tank, and the size tubing utilized is known as 375 inch. Attached to it is a nozale with a 2-inch flared outlet. An old bicycle pump connected to one side of the tank, and a pressure gauge completed the device.

In service, a gallon or more of gasoline is poured intothe tank and the pump operated to obtain a pressure of several pounds. The valves are then opened to permit a small quantity of the fluid and air to flow, producing a spray or vapor which will remove all grease and dirt easily and quickly, it penetrating to places not accessible with the ordinary brush.

CONE CENTRE DIVIDERS.

A tool that will be of service when scribing accurate-lines around holes or centres is outlined at Pig. 3 B and consists of the clamping sleeve and needle of a regular surface gauge, and a hardende centre box having a 68-degree cone at the lower end. The centre har may be made of drill rod and of the size of the surface member, so that the sleeve will fit. When the holes to be used as centres are larger, a 3.122-inch hall is employed. This has a 66-degree centre made in one side as depicted. The sphere is magnetized so that it will not fall off when heling placed in position. This device will prove useful for all around work.

THREAD CUTTING KINK.

When cutting threads on hrass rods or pipes, the dieshave a tendency to squeak. A solution of very strong soap suds applied to the metal will reduce the noise as well as the friction.

MARKING STEELS FOR STOCK ROOM.

System in the stock room is a valuable asset. Various grades of steel are utilized in the repair shop and it is an excellent idea to adopt a method of marking each separate

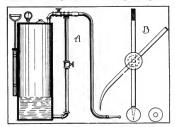


Fig. 3.—Suggestions for the Garage and Repair Shop: A. Eastly Constructed and Inexpensive Gasoline Compressor; B. Con-Centre Dividers.

hrand so that the workmen will be able to recognize them without the fire and water test. A way to insure against difficulty arising from mistakes in using the wrong brand

of steel is to have each brand or grade striped with a different colored paint. An index board bearing the colors of the steel can be made easily and hung on the rack con-

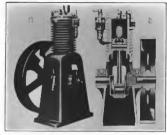


Fig. 4—Curtin Vir Compressor Adaptable for the Public or Private Garage and Service Station,

taining the material. By this system the brand of steel required can be located quickly and with certainty, and in addition, with a considerable saving in time.

CURTIS AIR COMPRESSOR.

The increasing number of light delivery automobiles is of value to the public service station, and many concerns maintaining one or two machines prefer to garage the cars in preference to taking over the care of the whilels. As permantic tires are generally employed on the light machines, it is obvious that to give the enstoner efficient and ground service the garage must be equipped with a tank of compressed air or other suitable means for the quick inflation of tires.

The Curtis & Co. Manufacturing Company, St. Louis, Mo., is marketing an afr-coded compressor which is produced in two sizes, having a hore and stroke of two by 2.5 and three by 3.5 inches, respectively. The device is depicted at Fig. 4, A and B, the latter view outlining its construction. Water-cooled types are also made, these bavings above and stroke of three by 3.5, 3.5 by 3.5 and four by 4.5 inches, respectively. Either design lends itself readity for belting directly either to line shaft or motor.

The pump is vertical of the up-plunger type, and it is sated that this construction climinates grace or oil from being carried over into the receiver and theuce to the tires. Several new features are emphasized of the compressor, these including a springless jalet valve on the piston head, fan shaped arms on flywheel which direct a current of air onto the cooling fins, etc. Lubrication is by a gravity feed oil cup on the side of the cylinder, the device supplying oil to the piston and wristjon. The crankshaft is of ample dimensions and throughout the best of material and workmaship are incorporated.

SEBASTIAN LATHE.

Many repair shops and private garages which formerly sort machine work outside have installed tables, an arrangement which not only facilitates the repair of motor cars, that permits of the completion of rush work, which is not always possible when outside shops have to be relied upon to flinish certain parts. The Sebastian Lathe Commany, Cinclusati, O., makes a specialty of lathes and tools and at PIg. 5 is presented a 15-inch lathe made by this concern which is low priced and of high grade material. It is designed especially for the repair shop as well as garage, we will be some or the property of the property of the property of the with furnished sears from the to 36.

The head stocks are strong, and solid and the spindles are hollow, constructed from a high grade steel and operate in phosphor bronze boxes. The rone pulleys have four steen and with back gear give eight changes of sueed. The lail stocks are of the cut-under, pattern, allowing the compound rest to swing parallel with the ways and over the base of the tail stock, with room to operate the feed screw handles. They have adjustable side movement for tapers turning, heavy spindles and self-discharging centres. The carriages are of the most approved design, rigid and substantial and T slots are arranged in both front and rear arms of the carriages.

When it is desired to use only the cross feed, the carriages may be elamined very solidly to the bed by a simple device. The cross feed screws are graduated to .001 lucb. Plain or compound resis are supplied and these are interchangeable. The tool posts are cut from a solid bar and the lead screws are cut carefully from a master screw, insuring accuracy. The countershafts have improved friction clutch pulleys with large surfaces, and ample provision is made for interication. The pulleys of the countershafts are sine inches in diameter with a three-inch face and are designed to run at 190 recolutions a minute.

The dimensions of the lathe are as follows: Swings over bed, 13 inches; swings over carriage, 7,5 inches; selent of hed, six feet; takes between centres, 40 inches; diameter of spindle nose, 2.125 inches; threads of spindle nose, eight inches; hole through spindle, 1.3125 inches; size of tools, 5,2 and one inche; ratio of back gear, 7,5 to one; diameter of tail spindle, 1.5425 inches; compound rest travels, 4.25 inches; the properties of tail spindle, 1.5425 inches; compound rest travels, 4.25 inches; capacity of centre rest, 3.5 inches. Hand rest and chuck plate are extra. A set of 10 tools is supplied with the lathe.

BENDING LIGHT TUBING

To bend brass tubing without kinking requires considerable care. Where small tubing is to be shaped, take a



Fig. 5-websattan 15-lack Lathe Designed Respectatly for Moreover Car Work and Constructed of Blash Grade Materials, close spiral spring that will make a neat, sliding fit in the tube, and anneal it at the part to be bent. Next take a niece of hard wood and make a form about which the tube

is to be shaped. To remove the spring after the bending process, twist it in the direction in which it was wound. This will serve to close the spring slightly so that it can be taken out easily. This kink may be used on tubing up to 75 luch in diameter.

DECARBONIZED STEEL SURFACES.

A fact that is not generally known and one that would save considerable rouble is that the surface of all steels as they come from the manufacture is decarbonized and, of course, will not harden. This condition cannot be overcome in the present manufacture of steel, as the action of the oxygen in the air affects the metal in such a manner while being put through the various processes required in its production, as to burn out the carbon in the surfaces. For this reason it is not good policy to select a piece of steel which will just "skin" up, but to choose one large enough to require a good sized cut before reaching the finishing surface.

CLEANING STEEL RULES.

Steel rules that have become dirty and rusty, making it difficult to read fine divisions, can be cleaned by covering with oil, and rubbing down with No. 0 steel wool. This will remove the rust without injury to the markings. If but slightly discolored, they may be brightened by using powdered pumite.

DRAWING TEMPER FROM BRASS.

Brass is rendered hard by rolling or hammering. Temper may be drawn from brass by heating it to a cherry red and plunging it into water, as though steel were to be removed.

LUBRICANT FOR OIL STONES.

A good lubricant for oil stones is made by taking one part sperm oil and one part kerosene mixed, or if desired two parts kerosene may be used.

CORRESPONDENCE

Wieing Master Vibrator.

(1)—I have a four-reliader pleasure ear which I have built were for rective in light expressing. The lightline is by a four-cylinder ceal, timer and batteries, but I find that the cells do mut last very long. Have tried to adjust them so as not to draw an excess of current, but were the season of content of the content

Cieveland, O., June 23,

The installation of a master vibrator would not only save current, but the operation of the motor would be improved, as the device synchronizes the Ignilion. At Fig. 6 is presented the wiring diagram which is self-explanators. The K-W ignition Company of Cleveland, O., manufactures a master vibrator which is designed especially for the class of work referred to. In fitting the member it is very important that the vibrators on the four-unit coll be short circuited and this is accomplished by shunting the circuit by the utilization of a copper wire connecting the vibrator and the primary terminal, as outlined in the drawing.

Cleaning and Lubricating Chains

(5)—What is the best method of cleaning and lubricating chains? I drive a four-ton truck and cover combinerable territory where the roads are bad, and often muddy. The chains become dity. Is it necessary to remove them from the car to clean off the dirt?
Fall Blyer Mars June 24.

ran miver, mass., sune 24

Some drivers clean the chains when on he machine, but this is poor practice as the cleaning fluid percolates in between the rollers and bearings, carrying with it the grit and dirt and increasing the wear. The chains should be removed and Immersed it a can of gasoline or kerosene and worked until all grit and dirt is removed. They should then be placed in a vessel containing a mirture of beef or mutton sailow, to which a quantity of powdered graphite is added, placed over a slow fire and boiled. The chains are then removed and hung up to cool. This mixture may be used from time to time, and may repleatished as required. It will be found that the tailow will penetrate between the rollers and

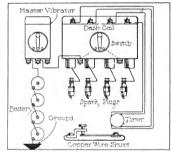


Fig. 6-Depleting the Installation of a Mastee Vibrator in Conacction with a Four-Unit Coll, Timer and Battery,

bearings, not only lubricating these members but will also serve to exclude dirt and mud, adding to the life of the chains and sprockets.

Install a Governor.

(6)—Am having trouble with my driver overspeeding truck at though I have not been able to catch him, am informed by business acquaintances that he races the machine when returning with the car cempty. Have been told that a governor could be fitted, but could not the device be tampered with?

New Baven, Conn., June 28.

Overspeeding is one of the evils which the owner of counterial vehicles should suppress. Many manufacturers equipt their machines with governors and these are seaded so that in the event of the operator tampering with them it is an easy matter to note his work. The make of car was not stated, but a governor could doubtless be so installed intat the operator could not change its serling without breaking the seal. This alone would convict him. The maker of the automobile could study the information desired.

A new two-ton Knox truck, made by the Knox Automobile Company, Springfield, Mass., was delivered to the Nelson Manufacturing Company of East Swanzey, N. H., a short time ago, The machine will be used in haul if, and to and from the depot, and in transporting sinck from Glisum to the factory.

STANDARD MOTOR TRUCK WARRANTY.

THE National Association of Automobile Manufacturers, Inc., at a recent meeting In New York City passed a resolution adopting unanimously a standard motor truck warranty and a standard rom or caution plate. The action followed a one-day meeting of commercial motor vehicle manufacturers. The warranty is the same in intent as the form recommended by the first convention of the trade held last March, but has been rearranged and altered to make it acceptable to the largest possible number of truck makers. The wording of the recommended caution plate is as follows:

CAUTION

Overloading or Overspeeding Will Void Your Warranty.

No. . . . Speed Milés Per Hour.

	Standard	Actual
Weight of chassis	Ibs.	1bs
Body weight allowance	1bs.	1br
Useful load capacity	jbs.	jb:
Total weight, chassis body and		
iond not to exceed	the	1bs

Name of Manufacurer.

It is Intended that this plate shall replace the nameplate on the dash, and shall be attached to the back of the driver's seat or in some other place where it will confront the man who loads the vehicle. It will have a thresfold purpose—to warn against the most common abuses; to exert a moral effect upon the hody huilder to keep the weight of the body down as nearly as be can to the standard body weight allowance, and to have a record on the machine of the total weight with load so that a "scout" for the truck maker can, when ho observes a flagrant case of overloading, have the truck driven to the scales and check up the actual weight with the figures on the caution plate.

Of the reports to the convention one of the most interesting was that of the committee on production, appointed at the first gathering of commercial vehicle men. The statistics showed blanks filled out and returned by \$2 companies, which gave a total of more than 18,700 commercial motor vehicles built and sold up to the heginning of 1912. These represented a total valuation of more than \$35,000,000. Calculated from the reports received, the production last year exceeded in value by 40 per cent. the manufacture and sale of such machines during all the previous years. This remarkable showing is believed to be due, however, to the difficulty of getting records dating back a decade or more in a number of cases, particularly where companies have been merged, reorganized or sone out of bausiness.

The work of collecting these statistics is far from complete, however, as at least a score of well established companies, including some of the largest manufacturers, made no returns, from which it is believed that the figures given do not represent more than two-thirds to three-quarters of the actual cultur.

Progress made in the investigations into heights of frames and pistforms from ground, wheel diameters and tire sizes, and proportion of useful load to chassis weight, had not developed any conclusions on which recommendations for standardization sceemed advisable.

That there might be no confusion or duplication of the work of standardization, there was a meeting of the commercial vehicle committee and President H. P. Donaldson, General Manager C. F. Ciarkson and W. P. Kennedy, chairman of the trucks standards committee of the Society of Automobile Engineers, preceding the convention, at which a clear understanding was reached regarding the lines along

which the two organizations should work. It was decided that the N. A. A. M, should take up such subjects as pertain especially to or affect the selling of trucks and their use by the purchaser, while the S. A. E., working in harmony, shall give attention to the structure of the vehicle and its units with a view to more economical production, improvement in design and construction.

It was the consensus of opinion that insurance rates, both fire and liability, are too high, and the whole subject including a proposal by an independent company of lower-rates than those usually quoted, was referred to J. S, Marylin, assistant general manager of the N. A. A. M. The next section will be held Nov. 7.

Those present were: S. D. Waldon, chairman, Packard Motor Car Company; A. F. Mais, Studebaker Corporation; William H. Brown, Mais Motor Truck Company; Edward R. Hewitt, International Motor Company; C. A. Neracher, Gramm Motor Truck Company; F. R. White, Baker Motor Vehicle Company; F. I. Harding, Peerless Motor Car Company; A. M. Chase, Chase Motor Truck Company; E. W. Curtis, Jr., General Vehicle Company; Alfred Reeves, United States Motor Company; Arthur W. Robinson, Locomobile Company of America: C. P. Morton, Packard Motor Car Company; O. S. Goan, Alden Sampson Manufacturing Company; H. S. Stehhlns, General Motors Truck Company; Walter C. White, White Company; C. H. McCausland, Klasel Motor Car Company: M. L. Pulcher, Federal Motor Truck Company; Harold L. Pope, Pope Manufacturing Company; H. Kerr Thomas, Plerce-Arrow Motor Car Company; Morris R. Machol, Hydraulic Truck Saies Company; J. S. Marvin, N. A. A. M.

BUYS ATTERBURY TRUCK.

The firm of Carney, Jackson & Mullen, Parkersburg, W. Va., recently placed in commission a 1.5-ton, 30 horse-power truck, made by the Atterbury Motor Car Company of Buffalo, N. Y. The vehicle is to be used in making deliveries of furniture in the outlying district, and if found satisfactory, the purchaser plans to replace other horse drawn equipment with similar transports.

TAXICAB BUSINESS SOLD.

Taxicals Limited, of Toronto, Can, formerly the Berna Motor Car & Taxicab Company, with a fleet of 30 machines, recently changed hands. George W. Verral, president of the Verral Taxicab Company, assumed control by purchasing the majority of the stock. Mr. Verral will add the cars to bis fleet, making a total of 50 which will be operated by the Verral interests.

COLVER WITH LOCOMOBILE PEOPLE.

Fred F. Colver has been secured by the Locomobile Company of America, Bridgeport, Conn., to have charge of its truck department in the New York branch, and to also have charge of the truck business in the surrounding territory. Mr. Colver is well known in New York, having been in the automobile husiness for about eight years. He has heen connected with the Pope Manufacturing Company; was manager of the Bulck Motor Company's Brooking branch and was assistant sales manager of the Studebaker Corporation's New York branch

ew@mmercial@rAccessories.

Tri-Radiant Fixture

The Lenhart Manufacturing Company, Philadelphia, is manufacturing and marketing an attachment for acetylene jamps of which it is claimed that considerable more light is to be had without undue consumption of gas. Three burners are utilized and so arranged that the maximum efficiency of the reflector is secured. The two outer burners are so constructed that they may be used or cut out as desired by the operator. The fixture is substantially constructed and nickel plated throughout,

Daisy Lighter.

The Empire Self-Starter Company, New York City, is marketing a device for lighting the acctviene headlights from the seat, the operation involving the opening of a valve member and the pressing of a switch plug. It differs from the usual lighting devices of this nature as the ignition system is utilized to furnish sparks at the burners. The operating and controlling mechanism is neatly enclosed in a small brass case which is secured to the dash. and three leads are employed for connecting the gas tank and headilghts. The device is fitted with a needle valve member by which the flow of acetylene may be controlled instantly. The Dalay lighter is not only inexpensive, but is attached easily.

W. & B. Self-Closing Waste Can.

Old waste saturated with oil and grease should not be left around the garage as the material is liable to ignite tbrough spontaneous combustion. The Wilson & Bennett Manufacturing Company, Chicago, is marketing a can for oily waste that differs from those of ordinary construction, inasmuch as it is self-closing, and it is claimed by the maker that it is impossible for the cover to be left open. It is constructed of heavy material, mounted upon substantial legs and is made in different sizes to meet requirements,

Rudeit Gasoline Register

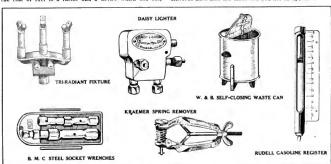
in the economical operation of the commercial vehicle the cost of fuel is a factor and a device which not only registers the amount in the container and that utilized, but measures the gasoline poured into the tank, is the Rudell gasoline register, made by the California Novelty Art Company, Los Angeles, Cal. It differs from those of usual construction as it is not dependent upon floats, springs, etc., for its operation. It comprises a glass gauge tube enclosed in a metal tube which is attached to the dash or any other convenient place. The tube is equipped with a calibrated dial denoting fractions of gallons, and the figures are read easily. A feature of the register is its ease of attachment, it being claimed that it may be fitted in 20 minutes, the operation involving the incorporation of a T in the line or the tubing to the fuel container.

Kraemer Valve Spring Tool.

One of the difficulties experienced in removing valves from the motor is that of compressing the spring and retaining it while the cotter pin or key is withdrawn. The United States Compass Company, Cedarburg, Wis., is marketing a device called the Kraemer spring remover which presents practical features lnasmuch as the vaive spring may be maintained in a compressed position, a feature facilitating the work. It comprises a pair of jaws pivotally mounted and these are actuated by a threaded bolt operated by a wing nut. Movement of this boit opens or closes the jaws, compressing or relaxing the valve spring as desired. The device is said to be applicable to any type of motor.

B. M. C. Socket Wrenches,

Socket wrenches are a valuable acquisition to the tool kit of the motor car as well as the garage, as by them nuts and bolts difficult of access with ordinary tools are reached easily. The Braunsdorf-Miller Company, Elizabeth, N. J., is manufacturing socket wrenches made of steel tubing and these come in sets of five having 10 openings for standard cap screws and hexagonal nuts. The instruments are strong and light and come in suitable cases. Sets of different sizes also are marketed and are inexpensive.



New and Novel Accessories Including Acctylenc Lighter, Valve Spring Tool, Self-Closing Waste Can, Gasoline Register and Triple tins Burner.

NO 7



VOL. III, JULY, 1912

AUTOMOBILE JOURNAL PUBLISHING COMPANY Times Bldg., Pawtucket, R. I.

William H. Binck, Treasurer. D. O. Binck, Jr., Secretary.
Publishers of

THE AUTOMOBILE JOURNAL THE ACCESSORY AND GARAGE JOURNAL 'Phone Participat 1000.

EDITORIAL DEPARTMENT: CARL A. FRENCH. C, P. SHATTUCK.

WILLIAM W. SCOTT.

ADVERTISING DEPARTMENT:

New Enginnd...

John W. Queen, 6 Bencon Street, Boston, Mans.
Control States...

W. R. Biodgett, 25 West 42nd Street, New York City.
'Phone Bryant 3728.

Western States— G. A. Eldredge, 304 Sun Baliding,

Detroit, Mich. 'Phone Cherry 1952, P. G. Lurian, 4707 Magnolia Ave., Chicago, Ill.

PUBLISHED THE FIRST OF EACH MONTH.

SUBSCRIPTIONS.

The United States and Mexico, the year, \$1 in advance; Canada and Forsign Countries in Postai Union, the year, \$2 in advance. Fifteen cents the copy.

ADVERTISING RATES:

Information given on request. All advertising copy must reach this office not inter than the 28th of the month preceding. Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, five, and musticipal apparatus, and the subject of the subject of the subject of the subject of the Stamps must be enclosed to insure return of uncelloited

Stamps must be enclosed to insure return of unsolicit contributions. Entered as second class matter, February 25, 1912, at the Pooffice at Pawtucket, R. L., under the Act of March 3rd, 1879.

INFLUENCE OF MOTOR TRUCK.

Economists assert that whatever tends to make mankind think in of material worth. In this respect, at least, the mechanical transport already has added substantially to the economic wealth of the world. Certain it is that business men have begun to think since they have been brought face to face with the transportation problem in its new phases.

In the old days, when horses were employed because they always had been employed, little thought was expended upon either the economy or the efficiency of the delivery system. At present, it is not enough for the husiness man to know that he can save money by the use of the commercial rehicle, but he is anxious to obtain maximum efficiency as well. This view is extended to all branches of the husiness, and in this manner the motor truck is indirectly responsible for reforms all along the line.

In an effort to measure the sum total of economic wealth represented in the growing use of the industrial transport, it will be found that several kindred industries are being fostered, in exactly the same manner as was true with respect to the so-called pleasure vehicle. This is apparent particularly in the body building buistess, and some very

interesting solutions to the various problems offered are being presented.

Those who are at all concerned with the study of progressive methods will do well to watch the influence of the motor truck upon the future of the world's industries. The surface only has been penetrated at present, and even those who feel best informed, are by no means able to indicate the hidden possibilities.

THE FARMER'S PROBLEMS.

The use of the internal combustion motor on the farm is by no means new. The stationary engine has played a prominent part in reducing the drudgery of farm work for some few years. It is not at all surprising, therefore, that the motor truck in its various applications is meeting with ready acceptance in sarricultural districts.

Until recently, it was generally supposed that the gasoline, or kerosene, tractor was destined to be employed on the large farms of the Middle West and Canada, almost exclusively. It now develops that the manufacturers are turning their attention to the so-called small farm, and with the result that might be expected. Once the possibilities in this field are made manifest, it is self-evident that the interest awakened will be in the same proportion as that represented in other lines of endeavor.

How far reaching this situation will be is indicated by the numerous agricultural trials contemplated during the present summer. Canada will hold its annual plowing contest during the progress of the Canadian Industrial Exhibition at Winnipeg this month. Argentine Republic already has a similar event under way. Trials also are to be beld in France, Austria and other Continental countries. In each instance the national government has taken a lively interest in promoting the affair. The United States appears to he one of the few nations which are not actively engaged in this attempt to solve the farmer's problem.

SENSING INDIVIDUAL NEEDS

That the business of seiling commercial vehicles is in radical contrast with the piessure car lines has been evident aimost since the very inception of this branch of the industry. Only those salesmen who have been able to appreciate this situation are in a position to meet the needs of the present or future. One motor truck judiclously placed will prove the means of seiling perhaps 50 others, while insmiftent attention to the individual needa and demands of the particular purchaser may result not only in the loss of subsequent sales but in materially retarding the development of the industry.

It is of particular significance that many manufacturers and agents are beginning to appreciate the truth of this argument. At a recent meeting of the Moor Truck Club in New York, an organization which has done much to foster a better understanding of this situation, the principal speaker dwell at some length upon the type of salesmanship required. He made a special plea for the recognition of the practical meeds of the individual case.

RUPPERT'S BREWERY ELECTRIC DELIVERY.

After Eight Years Practical Experience 41 General Vehicle Wagons Are Added to the Seven Trucks in Comparative Service with Animals and 35 More Are Ordered—System of Accounting for Work and Maintenance a Model.

By William W. Scott.

E CNONY is the one subject that commands the attention of all men of affairs. The application of the term may be with reference to innumerable conditions. It may be applied to every industrial or commercial enterprise, great or small, with precisely the result the attention given deserves. That is to say, that economy is obtained proportionately to the judgment and the desire of those who are the executives of the business concerned.

 form of expense and revenue. Such systems develop possibilities for economies, and this is particularly true with regard to industrial or commercial enterprises dealing with any form of transportation. It is essential that highway haulage be employed, especially if there be a considerable volume of local or community distribution. For this service the motor wagon is available. Its value depends largely upon the character of the freight carried and the method of use.

it may be assumed that where the work is now done



A Section of the Loading Platform at Ruppert's Brewery, Showing the Facilities for Economising Space and Time of Trucka and Men tu Delivery of the Keg Products,

because if is very generally believed that to discard what is in use, and to a certain extent serviceable, in on tecnomy. Perhaps another way to put it would be to any that no only a man of considerable resources and confidence in his own judgment would incur a large expense and entirely change a department and its service, when what he hadd was at least the equal of his business competitors, and reasonably productive.

when the property of Industrial and commercial activity, bowever, economy is not to be judged by the business of another. No man is justified in continuing a method when a saving can be made by a channe, and it is quite as desirable to economize in one department as another. Practically every business man can appreciate economy, however applied, but where one has averyged a condition and does not realise its extrawagane or the possibilities for saving, it is often difficult to convince one that this particular subject should receive the attention its importance deserves.

Every large enterprise is conducted according to system, which means an accounting that determines every by horse it is necessary to continue the system the vogue, and that the only manner on and that the only manner of men employed. For many and the number of the continue to th

There is no question as to the utility and capacity of the motor wagon as contrasted with any other form of transport, but to obtain the largest degree of service the delivery or haulage by these conveyances must be planned without reference to any previous method employed. Or viously to create a service and to follow practise with any other type of vehicle is to necessarily limit the results, for the acceptance of any one condition as a restriction is to minimize possibilities.

Without question the greatest successes are made through experiment, but experimentation with business is not favorably regarded by many men. Then what is deaired are practical examples that can be understood, in which the one method can be shown as against the other, preferably under the same supervision and management. The longer these have been employed the more dependable the conclusions and the more positive the results,

One of the most artiking illustrations of the utility and economy of the motor truck ia to be found in the delivery of Jacob Ruppert's Brewery, which is one of the largest industries of this character in New York. The haulage is hy two methods, animals and mechanical wagons, the former having been the vogue since the establishment of the brewery, the latter having been begun in 1903. The animal service was continued with increase of horses and borse wagons until the beginning of 1911, and since that time the motor vehicles have been increased rapidly and the horses have decreased, although there are now nearly

The Ruppert brewery is an immense plant. It is located in Third avenue and 90th, 91st and 92nd streets, and it is on a site that will permit of large expansion. Within two years something like \$2,500,000 has been expended for improvements and these have by no means been completed. When the plans made and contemplated are consummated it is expected the stock house canacity will be close to 2 000 000 barrels of heer annually, which tersely indicates the proportions of the industry. The delivery of so large a product is quite as important as producing, and with the economy of but a trifle a barrel it will be understood that the total annually may approximate an enormous sum. It is not too much, in the view of the experience of others, to expect a saving of perhaps 25 per cent, in the cost, and assuming that this will be from eight to 10 cents a barrel, a not improbable figure, the economy is from \$160,000 to \$200,000 a year, and equal to the income from \$4,000,000 invested at four and five per cent,, on the basis of stock house capacity.

It is not until the aggregate saving is known and the amount contrasted with the earnings of capital at normal rates of interest, that the possibilities of this one economy

are realized In other words, with the production and the cost of delivery as stated, the change in manner of haulage would be equivaient to an investment of \$4 000 000 without the risk or the care that the management of so targe a sum would entail. Not only this, there could be no possibility of loss or abrinkage. Viewed from this aspect the economy in hautage becomes a subject that demanda an attention at least equal that given any detail of the business and a degree of supervision that will secure this saving



A Portion of the Old Cooperage at Buppert's Brewery Utilized as an Electric Truck Garage—Now Filled to Its Capacity, a Model Station is to Replace It This Summer,

200 being utilized in the delivery at this brewery.

There is little doubt, however, that these will be disposed of long before their usefulness has been fully reallzed. As it now is planned these will be used so long as the period of transition continues, and it would not be at all surprising if within a year practically all of the horses were retired and the delivery made by motor vehicle, There is no question that this result will follow and it is merely a matter of time-in fact, largely an element of conveniencebefore the browery will utilize nothing but motor wagons and trucks. It is not to be assumed that this change is from any other reason than economy. Neither has there been radical change in methods. In truth, there has been adherence to the original manner of distribution with a surprising measure of success. It is within the range of prohabilities that the system can and will be materially improved, an end to which the management is making careful study and investigation, but what has already been accomplished has been along the lines of horse transports and general custom and by utilizing the superior radius of movement.

If one fact should be impressed upon the business man It is that with so large an enterprise, conducted with the system and care that its proportions should demand, there should be great possibility for economy, especially when it is reasonable to assume that with horse delivery there was equal attention given to detail. Not only this, it is probable that with concerns not as exacting and with less perfected methods of accounting these mostibilities are ever greater.

Any practical business man would unhesitatingly say that it would be decidedly unwise to reject any opportunity, no matter how small the result, for manufacturing or seli-ing economy. This heing no there would be nothing inconsistent in a reduction of the expense for distribution, of distribution, of which delivery constitutes a larce part. It is apparent that which delivery constitutes a larce part and it is apparent that ritbuting, so far as haulage was concerned, received practically no attention, and the expense was accepted without outsetton.

In dealing with this subject from the viewpoint of commercial economy it is purposed to consider the utility of the electric vehicle in brewery service, for while the Ruppert brewery has a group of gasoline wagons of a haifdozen different makes it has now in its garage 48 General Vehicle machines, with orders placed for 35 more, so that within a comparatively short time there will be 83 G. V. trucks and wagons employed for its local and suburban distribution.

In selecting the electric machine for delivery within the radius of its movement no decision was reached until after experiment extending over a period of years. The first trucks were four in number and were delivered in 1903. These were of the old construction, of the pedestal type, so-called, with two motors instead of one and with the plain wheel bearings. The batteries were heavier and less efficient and the mileage was less than the later vehicles. These were given a character of attention not as productive of efficiency because they were not as well understood, and their maintenance and upkeep was not systematic; that is, as compared with the methods the vogue today. They were regarded as experimental, and so they were.

These machines were placed in precisely the same service as the horses and they were worked hard. They were subjected to every test and were driven by men who had previ-

ously driven horses. These men were not experts and knew nothing of the trucks. their knowledge being gained by their daily work. It is natural to assume that their inexperience was more or less expensive. But the trucks endured and they did the work, in 1907, when these trucks had been used for four years, three 3.5-ton trucks were ordered. These machines were used for the delivery of bottied goods and were, with the four older machines, kept at the brewery in convenient shelters and given the attention that the experience with

others dictated was wise. These, too, were placed in charge in the detailed tabulation presented below: of men who had previously handled horses.

The service given by these trucks was more severe than the machines now receive. The three 3.5-ton machines were the first of the present standardized types to be used. These were single motor driven, but with the chain exposed. The pedestal suspension had given way to the semi-elliptic springs, and there were numerous other improvements developed through four years of consistently progressive manufacturing. These seven trucks were given three years' hard service before the results were sufficiently convincing. The records evidenced that the work accomplished was such as to justify a transition of the delivery vehicles, and to substantiate the belief that with systematic care and careful routing of the distribution the electric truck was to be preferred to other forms for the work, within the limitations of the battery charge. Other types of motor wagons were used, for the experience was not confined to electrics.

The examination of the records resulted in a conclusion that it would be desirable to provide a garage, and a cooper shop in the stable yard between 90th and 91st streets was

decided to be sufficient for the immediate purposes. The order was given for 41 trucks and wagons, of which 35 were of five tons capacity; four, two tons, and two one ton. Of these, 40 were for delivery service and the other was built as an emergency wagon, being geared to have a speed of 15 miles an hour and a mileage of 45, travelling half of the distance loaded. It was also decided to install dynamos for the purpose of supplying the current to be used, this plant being incorporated with the regular power installation of that section of the brewery near at hand. In the garage was placed a charging board with capacity for giving current to the 48 machines simultaneously. Near this was located the battery room. The garage equipment also included a half-dozen spare batteries. Besides this, a workshop was provided and the garage was equipped for giving other attention.

The garage was opened Feb. 1, 1910, and James B. Scanion, whose experience had been for years in mechanical and electrical work, and for a long period with electric wagons, was made manager. When the machines ordered were delivered he had 48 vehicles in his care. These, according to capacity and length of service, were as outlined



Some of the General Vehicle Electric Trucks, Five Tons Capacity, in the Equipment of the Keg Delivery Department of Rappert's Brewery, New York City.

Year De-		Electric Tr		pment.	Total in	
livered	One-Ton	Two-Ton		Five-Ton	Service	
1903	0	0	0	4	4	
1907		0	3	. 0	3	
1911	2	4	0	25	4.1	
	diese.	-	400	Barba .	des	

The results with this equipment were so satisfactory that during the present year four two-ton wagons, two 3.5-ton trucks, and 29 five-ton trucks were ordered, and these will be delivered as rapidly as they can be produced by the maker. It is probable that all of these will be in service by the middle of August, and perhaps before. When these have been received the electric delivery vehicle will consist of two one-ton, eight two-ton, five 3.5-ton and 68 five-ton, a total of 83. Of this number, 82 will be in service regularly, and the other will be the emergency wagon.

Considering this installation for a moment it must be understood that even with the five-ton machines the load is not increased as compared with an average brewery de-

is systematized with extreme care, the heavy loads being sent away first in the day. The trucks report beginning at 3 each morning. of the working day during the summer period and at 4:30 in the winter, Each driver goes to the garage to find his vehicle in readiness, or one that he is to use that may be temporarily assigned, and he drives it to the loading platform. Each truck loads at a particular place and at a stated time for the first load of the day. A specified





Pive-Ton Truck with 50 Half-Barrels, a Normal Freight,

Pive-Ton Bottle Truck with Capacity of 180

tes of 28 Betties Each. time is allowed for loading. The kegs and barrels are brought to the loading platforms by conveyers and packed into the trucks. With the bottle department, the crates of bottles are brought to the loading platform by similar means and loaded. As stated, the full load for a five-ton truck in 50 haif-barrels or 130 crates of

livery horse team. The freight is from 50 to 52 haif-barrels to a load, and the weight is approximately 11,000 pounds, hut while this would seem to be more than horseflesh could endure for any extended period, it should be known that the daily mileage for horse teams is seldom more than 12, and generally it will hardly reach this figure. The horses are carefully selected for the work, and are extremely large and powerful. A team will range in value from \$1000 to \$1500, and some will exceed the last mentioned sum. They, with the wagons and other equipment, will closely approach a cost of \$25000.

With practically no difference in the load carried by the whelled there are hut two other factors for superfority, the one being the greater speed, and the other the greater distance that can be travelled in a day. The electric truck of five tons capacity has a hattery mileage of 25, and a speed of seven miles an hour, and the 3.5-ton truck a hattery mileage of 40 and a speed of cight miles an hour, half of the hattery mileage with a full load. This will permit carrying the freight practically double the distance that a horse team could be driven consistently, and at about three times the pace at full speed. But under any circumstances the truck of free tons capacity is at least 100 per cent. Instet the truck of free tons capacity is at least 100 per cent. Taster

The brewery service is different than almost any other in that there is comparatively little unproductive milesers; that is, in the sense of haulage, for when a freight of 50 half-barrels, for instance, is taken out, a load of from 75 to 90 empty containers is brought hack. There are exceptions to this, of course, but reference is made to normal conditions. The Ruppert

Brewery service extends in every direction and the delivery is divided, with the gasoline trucks taking the longest hauls, these being into Westchester county, to villages, towns and cities within a distance of say 20 miles. It may be profitable to send products further by motor truck, but unless there is the productive return mlieage this has not heen satisfactorly demonstrated. The delivery within 20 miles, however, is generally made by the electric machines.

The manner of delivery

bottles The time allowed for a day's work for the men is eight hours, and this fact necessitates careful consideration of the delivery. This is arranged by the superintendent, the chief of the shipping department, and the manager of the garage, because each executive must co-operate with the The routes are made out with several objects in view. The first is the distance to be traversed, the second the number of customers to be served, the third the highway conditions, the fourth the traffic and the different probable causes of delay, the fifth the capacity of the vehicle as to speed, freight carried and battery mileage. The problem is to serve the greatest number with the least travel. the solution of which entalis careful study of every factor and probability, so that the assignments will necessitate some of the machines making three trips to and from the brewery to serve a route, while others make two and even one. The order of delivery is made out and the driver is required to follow this. With a reasonable allowance for delays the trip time is established.

Now it must be understood there is a considerable eleasticity required in this service and a route that may be easily served during the cold or even moderate temperatures will be beyond service with any form of single vehicle when the heated periods of the year trebles the consumption. Then





One-Ton Special Delivery Wagon, Keg Department—Speed to Wiles, 15 Miles—Always Rendy for Service.



One of the One-Ton Special Delivery Wagons of the Bottle Depariment, Utilized for Quick Service,

the routes must be adjusted and the delivery equalized so far as is possible, what was as rive by one machine belief divided and another vehicle or vehicles used. Perhaps the route may be shortened and a second or a third delivery made. Besides these conditions, there are the special orders which must be given equal attention.

During the summer the parks and places of recreation must be served, as well as the regular usuloners, and these deliveries are dependent upon the weather. This class of patronage is no inconsiderable part of the hustiness and many of these customers are long distances from the hrew-ery. To illustrate, it is 1.7 miles to Concy island, where the season is not more than four months of the year. The same applies to numerous places that are not as familiar to people generally, but which are equally desirable as apparatons. The distribution is to Long Island, to New Jersey, and Westchester county, as well as the city itself, which is a very large area.

It is the duty of the superintendent to have the products delivered, and the shipping department depends upon the garage manager for the vehicles, no matter what the conditions. It will be seen that it may be necessary at any time to provide for a call considerably in excess of the normal distribution, and this places a responsibility upon the garage manager of having the vehicles required. While each truck or wagon is ready in the morning, the demands reduce the hattery capacity, so when a machine is brought into the garage it is tested to ascertain what current is available. While "boosting" is not resorted to suless necessary, it may be that there will be a call for the work that this machine can do without additional charging. If so, it

is utilized. But should there be a long distance cell a freesis battery is substituted, the one removed placed on clearer, and the truck sent away with as great capacity as when all it was first started in the most part of the property of

This means that the garage manager must know the exact condition of each hattery and of each machine as his disposal and be able to provide the shipping department with a truck or wagon that will do the work required. That there may be no diminution of service and that there will be abundant facilities, it is necessity to maintain each rechied to the highest standard possible. This can only be done by systematized attention. Whenever a condition is noted that may result in damage or eventual failure, repair or resoration is immediately made. This minimizes the cost of maintenance and the loss of service, and yields the largest degree of useful work. This system insures very desired quality and the greatest economy. The entire value of any motor reblicle is its service, and to lose this greatly increases the cost.

The emergency wagon is a very important equipment. It is maintained with its battery as fully charged as is possible, in readiness for quick service. Should a driver meet with an accident that will disable his vehicle or greatly reduce its capacity he notifies the garage manager. One or two men are dispatched with the "first aid" and this may mean a spare axie, a spare wheel, spare tires, spare armature, spare controller, spare chains, or whatever may be needed in addition to the regular stock carried in the emergency wagon. Of course there are jacks, tackle and tools ready for accident cails. The damaged machine is temporarily repaired, or hauled from a ditch, or towed to a convenient charging station, and started on its route with as little time lost as is possible, if it is necessary to change the load to another machine this is done, but such events are rare indeed.

During the seasons of the year when the work is the hardest for the wagons and the delivery demand is greatest, the garage force is always huslest, because it is necessary to drive the machines much fairher and care is only possible during the time they are in the garage. Besides, every presention must be taken against loss of service. Yet so thorough is the work performed that extra Sunday labor is the exception, and not the rule.

The repair department is a decidedly important division of the garage. Here is kept a stock of parts of every type that enters into the construction of the trucks. Nothing that might be needed is lacking, for it is far better to insure against delay than to be delayed, even for a short time, and the machine and tool equipment is such that

								RUPPER									
								CHARGING	3 81	LEE	1						
		D	ATE				1991					DATE				191	
Ven	ОИ		43(1)		Corre	RI MARKS	100		08		(1F)			Cerry	REMARKS		
No	Trear	Amp.	Velt-	Time	Amp	\ olts	CHECK		No	Tree	I sup	\ elt+	Treas	From Step Salts		A1.M 18.8.3	
																	_
+					-	-			-				-				
									-		-						
-																	
-	-					-			+	-		-					
	-																

) harging Record of the Ruppert Brewer) Garage, Arranged for 30 Entries. Form 12 Inches Length and 13 Inches Width, Perforated for Lone Lenf Binding.



Driver's Daily Mileage Report for Kuppert's Brewery, Areauged for 30 Entries, with the Numbers of the Vehicles of Either Bottling or Keg Departments Princed—Form 12 Inches Length and 0.5 Inches Width, Perforated for Loose

work can be done at any time that it is necessary. The facilities are sufficient to undertake any repair, restoration or overhaul, and the workers are qualified to carry out any demand made upon them. It is not necessarily a large organization, but it is efficient. The hattery is the heart of the electric whole and the hattery department of the garage is under the supervision of the manager and the best assistants that can be procured. There is no economy in cheap men for work on hatteries, and there is need of good judgment in working the batteries to maintain them at the lightest discharge and garden gainst deterioration. In keep-like the control of the procured gainst deterioration, and work that may be necessary, so that it is not often that the hattery maker is called upon to do work of any kind.

Necessarily a very large part of the responsibility for the success or faiture of so large a delivery service fails upon the garage manager. His judgment and resourcefulness have much to do with the results, and the degree of economy obtained. It is he who can utilize every hattery to its limitations, give the use of the trucks practically continuously when this is desired, and by intelligent supervision minimize wear and upkepe expense as well as do the work with the fewest vehicles.

Figures are not available relative to the Ruppert service but the surest indication of the economy of the electric wagon is the order given for 35 this year and the increase of the total to one of the largest, if not the largest, of any one make of machines in use in the metropolis. There would he no investment by a progressive husiness man if there were a doubt as to the result.

Relative to the system of noting expense it should be stated that the record of the Ruppert brewery is one of the most comprehensive existing in a private garage. When the vehicle is received it is given a number and it is identified by this in all records. As the machine is brought into the garage, to illustrate, the driver reports to the manager's desk and there signs the driver's daily mileage report. These reports are made out for the bottling and the keg departments, the records being kent for each division of the husiness with the ejectric trucks. The report is entered against the printed number of the truck and this may account for one, two or three trins by miles driven. and the total for the day, together with the time of leaving and returning. The driver signs his name and also enters the condition of the vehicle and remarks, the latter indicating any needed attention. This applies to every machine in service. Examination of this report is then made by the manager, who gives instruction to the foreman, the mechanics, or the hattery men. As might be assumed the keg department of the brewery is the larger department.

It is necessary for the vehicles to be inspected frequentty, and there are two classes of examination. The one is by the foreman, which is made as often as he or the manager may decide is necessary or desirable. Naturally the frequency of such inspections depends insredy upon the condition of the marhines, and are based on routine or the report of the driver. The routine inspection is with reference to the vehicles generally, and the report examination is, of course, specific. These are thorough and are intended to insure against wear or damage by whatever work may be necessary to make adjustments or restoration. The other examination is designated as general, this heigs with reference to every part of the machine and to determine its exact condition, both as to chassis and body. The tires are given practically daily attention.

Careful record is made of all the time of the garage employees while working on any vehicle. This applies to the routine work, such as washing, oiling and greasing, and to all mechanical labor, each being kept separately for each

							•	JACOI	3 RUI	PPEF	RT'S B	REW		ST OF
											TRUC	Κ		MONT
	Foreman	General	Body Material and Labor	Bettery	Battery Material	Controller Labor and Material	Current	Clobes and Lamps	Motor Labor and Material	Paeting	Running Gree Material and Labor	TIRES	WIRING	
1														
2								_						
3								-						
								_					_	
5														
6			1											
7														
4														
0														

Cont Record of the Ruppert Brewery Electeic Truck Department, on Which Is Noted Every Care and Maintenance Expense.

The Form is 12.5 inches Length and 20.25 inches Width, Per

JACOB RUPPERT'S BREWERY ELECTRIC TRUCK DEPT. INSPECTORS REPORT						
No di Viriale	DEPARTMEN.	CONDITION	DATE			
420						
171						
172						
.17)						
124						
173						
176						
177						

Inspector's Report, Ruppert Brewery Garage, Arranged for 30 Entries, with the Numbers of the Vehicles of Either Bottling or Keg Departments Printed—Form 12 inches Length and 83 Inches Width, Perforated for Loose Lenf Binding.

machine. Besides this all material used is accounted for. whether it be for the body, hattery, controller, motor, runping gear, wiring painting lamps and globes and for special work as well. The material is requisitioned from the stock room hy order of the foreman or manager, and the charges for these requisitions made against each machine. The labor is charged from the time cards as approved by the foreman or manager. Current is charged at a given cost. If car fare be necessary this is included in the record, together with miscellaneous expenses, and also a determined figure for the bookkeeping expense, this being a fixed amount under ordinary conditions. If a vehicle is out of service this fact is also recorded, with the cause for withdrawal, and when it is placed in commission a similar record is made. Each day the total cost and the total mileage is entered, and the cost for each mile driven. With this is any comment that may be desired

From this it will be seen that nothing is neglected that will afford specific detail as to any phase of attention, maintenance and work performed, not for any given period but for each day. This record is made on a large blank that will allow entries for each day of the mouth and, being separable lato haives and bladable in loose leaf blidders, it is possible to have volumes of reports for mouths for each division of the delivery, or separate records for each machine by years, as may be desired. The detail cards and

requisitions, expense vouchers, and the like, are also separately filed, but the "cost sheet," which has been described, summarizes every fact.

This cost record merely applies to the matter of operation and maintenance and the statement as to mileage expense does not laclude the fixed or overhead expense. This overhead includes the interest on the capital invested, the depreciation or deterioration through usage, fire and liahility insurance, garaging or storage, lighting, heating, water, telephone service, taxes and other similar charges. The manner of computing the fixed expense and the items entering into it are facts not material. The combination of the totals of the overhead and the garage charges or expense will show the aggregate cost of the delivery, and this apportioned by delivery unit will indicate the average a unit or package, which is either barrel or crate of bottles.

It is possible, however, from the daily cost and the monthly and yearly averages, to compare the service of each vehicle for a given period, ascertain difference in maintenance expense, learn causes for actual expenditure as compared with theoretical figures, trace reasons for inefficiencies of machines or service, and apply such remedies as are necessary to establish or restore a standard.

The current is produced by the brewery power plant and the cost is decidedly less than were it supplied by a lighting or power enterprise, which is also an economy favorable to a large installation.

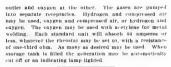
About 200 horses are now in the service of the Ruppert brewery. As the trucks are delivered it is expected that they will be sufficient to keep pace with the demands upon the delivery or shipping department, but the animals will be available for work within their limitations. When the writer visited the plant many of the horses were idie, although all of the trucks and wagons were in use, and two men were husy exercising the teams. There was no better evidence of the inelasticity of the animal service and the reserve capacity of the electric vehicle, for the former means a constant expense when not worked, and the latter will cost but a trifle when withdrawn, and will deteriorate so little that depreciation may be said to be negligible. The original four trucks installed are in use every day and, with the attention now given, appear to be more serviceable than when new. They are now in their ninth year of serv-

I YI	AR 191			1	1			1 1		
Wednes	Car Fare	Baskeeping	Macchaeons	Days in Service	Days out of Service	CAUSE	1 m	Total	S &	REMARKS
		_	-	-			\vdash			

and the Service Given by Each Vehicle by Day, and Kept in Loose Leaf Binders, One Sheet Canaditating a Month's Reportforated for Separation and Binding, and Printed an Both Sides, ice and may be regarded as having practically demonstrated results that may be reasonably anticipated with the vehicles of more recent construction. But considering the advances in the designs, construction, materials, and manner of supervision and maintenance, there is abundant reason to expect even more extended use

The Ruppert brewery will build a splendid garage this summer for the electric machines. This may be of several stories, on the site of one of the several horse stables, or it may have a single floor and extend from 91st to 92nd streets, with sufficient area to shelter practically 150 machines. Whatever the form the structure will have it will he as complete and as well equipped as ample resources can provide and skilled engineering and practical knowledge would dictate. If of multiple-story type it will be possible to increase its height to yield additional capacity.

With the new trucks and the new garage the need of the present stables, or at least a part of them, will have become so diminished that the ground on which they stand can be utilized for other purposes. This real estate is constantly increasing in value and business judgment would impel its heing used to a profit, either by the further expansion of the brewery plant or for other purposes.



DETROIT WAGON IN ARMY SERVICE.

The Detroit electric wagon of 2000 pounds capacity that has been in the service of the War Department of the United States government at the arsenal at Rock Island. ill has completed a year's service, and the report covering that period indicates that the vehicle has been exceedingly satisfactory. in the statement made concerning it no comparison is made as to cost of operation, nor is comparison made with the work of animal wagons, but it is regarded as possessing qualities that will in every way meet requirements.

The Rock Island arsenal is located approximately in the centre of the section under the jurisdiction of the Department of the Misstssippi, from which distribution is made of supplies for the different garrisons and posts. Officially at Rock Island the service extends across the Mississippi river to the city of Davenport, Ia. The portion of a report relating to the service of the wagon, states:

"During the year which the car has been in service it has been on the road every day and has been travelling as high as 65 miles on one charge. No trouble whatever has been experienced in getting through the snow. Every day we make regular trips to the postoffice with mail and also break the roads when the snow is sometimes, three, four or five feet deep in places. We have not missed a single trip during the entire year with the exception of one day when the car was sent to the garage for inspection. For the general hauling work

required at the arsenal, we find our Detroit Electric to have plenty of speed, ample mileage capacity and power."

The vehicle is equipped with a 60-cell A-6 Edison batand is made by the Anderson Electric Car Company, Detroit



Detroit Electric Wagon in Service with United States Army at Block Island Arsenal, From either point of view its value may be utilized and the actual cost of ground rental greatly reduced, it is not practical to estimate in dollars an approximation of the economy by the elimination of the stables and the utilization of the electric truck. That there is a large saving however. cannot be questioned.

CONSERVING WASTE CURRENT.

The Electric Storage Battery & Manufacturing Company, Cincinnati, O., produces the Hydrox electrolytic hydrogen-oxygen gas generator, which is designed to utilize the electrical units that would otherwise be lost in heating rheostats when charging atorage batteries, in the generation of hydrogen gas. Hydrogen gas is employed for welding the joints of lead batteries (this process being known as jead hurning; and is often generated from zinc and acld. The Hydrox generator is connected in series with the theostat and the car on charge, and the current passing through Its solution decomposes the water into hydrogen at one

FREE MONTHLY INSPECTION.

The Boston Edison company has announced to all the users of electric vehicles in itoston and vicinity that it has arranged for free inspection of machines at its Atlantic avenue garage and owners are invited to avail themselves of the service, the purpose being to bring about greater efficiency and reliability by the application of the practical knowledge and experience of its experts. The inspections will be made monthly, as arranged by the owners at the garage, and record will be kept of all machines and their conditions and results accomplished. It is anticipated that the plan will result in a decided increase in the use of electric vehicles in that city and vicinity,

COUPLE-GEAR ELECTRIC FIRE APPARATUS.

In the extremely exacting service of the fire department of New York Ciry, it may be assumed that the test that may be given apparatus is such that, if it shall be approved, it will meet the requirements of any other musticipality in this or any other country. The fire risk in New York is believed to be as great as in any other eity in the world, largely because of the character of the buildings and the argety because of the character of the buildings and risk complete. The country of the character of the pullings of the reason the equipment desired is the best case of the reason the equipment desired is the box.

For a year and a half an electric driven apparatus has been tested in a section of the city where its calls have been decidedly numerous, and the results were so satisfactory that two other similar apparatus have been added to the department, while a test is now making of a fourth, which is the only electrically driven steam fire engine in America, so far as is known. willingness to utilize equipment that may be regarded from the New York viewpoint as more or less experimental. The reason for this comment is to make clear that there is a conservation in the use of power driven apparatus to may appear to those who are not informed of the policy to mean practically rejection of this form of equipment.

It will also be understood that this policy means that whaters may be employed by the department is subjected to tests of endurance that might appear to be unnecessary, and that such trials are prolonged deproid what might seem to be a satisfactory demonstration. However progressive New York may be otherwise, the fact that the apparatus of its fare department is practically all animal drawn indicates that when safety of property is the stake nothing is taken for granted.

The installation of the first apparatus by the Couple-Gear Company of New York was a concession that was based



Water Tower No. 2 of the New York Fire Department, the Second of Three Apparatus Converted from Horse Draft to Use with Couple-Gear Gasoline-Electric Tractor—Estimated Cost of Fuel and Oil for First Year's Service to \$18.

It can be said that the present policy of the men who control the fire protection of New York is to avoid experimentation, that is, so far as to do so would, in their opinion, develop a possible weakness in the service. It is believed that whatever equipment is suitized it must be, so far as human mind can forecast possibilities, beyond failure. That is to say, that no matter what the emergency or the conditions the apparatus available must be instantly ready for any demand that may be made upon it. Such emergency might not eventuate in a score of years, but the service must be prepared. For this reason there is no disposition to take chances. That is, whatever is absolutely established as dependable will be used until experience has proven that whatever improvement has been made is equality-reliable.

What has been stated can be applied specifically to the borough of Manhattan, to a considerable portion of Brooklyn, and perhaps to a portion of the borough of the Bronx, but in the sections of the city given over to detached residences, to what might be considered the suburbs, there is a on substantial evidence of the reliability of the tractor. The addition of the other three, after nearly a peer and a better service, in regarded as recognition of qualities that justify more extended as the control of the control of the control of the ments, of two types, in New York service would appear to be a belief in this character of apparatus

It may be said in connection with this statement that there are limitations to the size of the apparatus that is considered best adapted for all-round work in the business and manufacturing sections, and that there is no belief obtaining that with skyscrapers and mammoth structures equipment of largely increased capacity is required. Another way of putting it would be to any that were material changes to be made, these would be with a view of securing greater mobility and eliminating what might be causes for delay under adverse weather conditions. Economy is not the principal purpose of the department executives. This is commendable, but reliability and dependability are the objects to be obtained.

Water towers as used in New York are about 45 feet in

length, being approximately that of a ladder truck, and weigh about 14,000 pounds ready for service. The tower or standplipe is collapsible so that when lowered it may be drawn about and boused readity, but when elevated it may be extended to a height of 65 feet. It may be directed from the deek of the truck and several lines of hose may be simmered into it, so that a solid stream may be directed to an elevation of perhaps 100 feet with great force and effletiency. So practical and so useful are they that these towers respond to first alarm fires.

The animal team for such apparatus is three large horses and the speed for the usual range of response is approximately six miles an hour. Besides, driving such equipment through atteres foften congested with traffic is accompanited by danger to apparatus and to vehicles and occupanits of the ways because of the difficulty ocntrol. The streets of New York are not always wide, and to make speed mean that case and certainty of handling is imperative. Fire Commissioner Waldo was the first to make the motor driven apparatus experiment. The No. 1 tower was selected for the trial and this was placed in commission at engine house No. 3.1 at Lafayette and While streets, where



Engine No. 117 of the New York Fire Apparatus, the First Steam Pump in the Country to Be Driven by Electric Battery, Equipped with Couple-Gear Tractor—Has a Speed of 20 Miles an Hour and Can Make 22 Miles on a Single Charge,

it was in service with two horse drawn steam fire pumps and two horse drawn hose wagons.

The front wheels, poles, and other horse fittings were removed and in the place of these was substituted a Couple-Gear gas-electric semi-tractor of 10 tons capacity, in which the fifth wheel or turntable of the tower was placed in the centre of the tractor platform. The tractor is fitted with a 50 horsepower four-cylinder motor that generates electric current which is supplied to a storage battery carried under the chassis frame, and from this battery it is drawn by four motors fixed to the ends of the axles. The motor armatures revolve and pinions at the ends of the armature shafts mesh with racks within the inner peripheries of the heavy disc wheels, turning the wheels to any predetermined speed, according to the graduations of the controller. The hattery is kept charged by the motor and the tractor may be operated as is any electric vehicle, having all the flexibility and ease of control. As might be assumed there is no limit to the milesge of such an apparatus aside from its speed, for it may be driven as long as the engine can be operated, and beyond this to the capacity of the hattery or the charge remaining in it. All operations of charging are automatic, the engine being started either at the start or at any time when considered desirable. The tractor is driven and steered by all four wheels and as each wheel is independently driven there is always the same tractive effort by a wheel, no matter what the arc of turning. Besides this the tractor may be turned in a very small circle, the radius being the length of the water tower.

This tower has been used in Manhattan, responding to alarms between Canal street and the battery, and in a year and a half has not been in the repair shop so far as the condition of the tractor itself is concerned, but was out of commission while repairs were made to the tower standpipe, which was hurst through freezing at the Equitable building fire. At that time the tractor remained at the fire for three-days, the tower being used for flooding the ruins, and the motor was driven during that length of time. The wheels were frozen into lee in the street a foot in thickness, but when chopped partly away the tractor, bandled by an experienced driver, broke itself away and climbed out of the holes. It was estimated that the cost of operating the

tower, for gasoline and oil oils, during the first year, was approximately \$18, or about \$1.50 a month. The tractor is geared to a higher speed than were it used for other service and can be driven faster than 15 miles an hour. It will make all runs and reach free with approximately the speed of the lightest horse drawn wagons.

The water tower is practically the beaviest apparatus in use, and the next are the ladder trucks. and the third the steam pumps. The steamers are usually drawn by two horses. In the nature of an experiment the second installation was shortly after the first of April, this year, when engine No. 117 was converted by the removal of the front wheels and all equipment forward of the "gooseneck" and the substitution of a twowheel tractor with its deck or frame extended backward sufficiently so that on it may be mounted the "gooseneck." Above the deck is the battery and the

control, the seat, the steering wheel and the dash, and helow it the heavy springs, the wheels, axies, hrakes, and connections, and under the deck is a second section of the battery and the tool box. The general appearance of the apparatus is shown by the accompanying illustration.

This is driven by current drawn from the battery and supplied to motors contained in each of the two forward wheels. Each of these motors is three horsepower and will take a momentary overload of 200 per cent. so that for a brief period 18 borsepower may be utilized. The capacity of the battery will be exhausted the more rapidly when bigh speed is made, but it is estimated that the engine may be driven 22 miles on a single charge, and to 20 miles an hour if this should be necessary.

The electric battery steam fire pump was placed in service at the De Kab areaue station and is now in use daily. One of the first runs that was made after it was placed in commission was to Coney Island, which is approximately 12 miles, and this is many times what would ordinarily be required in requiar use. The claim made for this apparatus is that it has far greater speed, can be driven much turther, is tirclens, is always rendy, can be far more easily controlled, and that it is in every way dependable. One of the chief reasons for the trial of this form of tractor is the belief that it would be more easily driven in traffic, and that four wheels is the logical number to use because of the many corners to be turned and the obstructions to be avoided, the shorter apparatus being faster than the long, all other conditions being equal.

The second water tower, known as No. 2, was placed in service April 1, and the first week in May tower No. 3, in duplicate of No. 2, was also placed in commission. Tower No. 2 is shown in an accompanying illustration, this being taken just before it was regularly installed. Both of these are, like tower No. 1, hauled by assoline-electric tractors, and with this equipment have the same relatively wide radius of movement. Official reports as to the work performed by No. 1 tower have not as yet been made, but it is pointed out that the installation of the second and third, as well as the conversion of the steam pump, is evidence to Commissioner Johnson and to Chief Keelon that the results have thus far hear astifactory.

New York is the first great city to experiment with the tractor in hauling apparatus. The work that this apparatus will accomplish will receive the closest attention of electric vehicle experts and advocates, as well as the more general observation of all fire department executives and attaches.

M & P ELECTRIC DELIVERY WAGON.

The design of the 1909-pound delivery wagon produced by the M & P Electric Vehicle Company, Detroit, differfrom the conventional electric chassis in that the motor is carried under the seat of the driver and the power is transmitted by a shaft extending between the battery sections to the Jackshaft, and thence by side chains to the rear wheels. With the installation of the hody equipment the machine differs but little from the accepted and approved designs.

The wheelbase of the wagon is 100 inches, with standard tread, and this gives a loading space of 80 by inches for either open or enclosed body, the latter having a height of 58 inches. There is a liberal seat for the driver and sufficient leg room behind the thin, straight dash.

The chassis is of three-inch steel channel section, hor riveted and strongly braced. This frame is mounted on full elliptic aprings 36 by two inches forward and 40 by two inches rear, with nine inches spread, the rear springs being attached to a slide that is boited to the chassis frame, so that while the spring is maintained in its relation with the chassis it has a forward or backward movement, proportionate to the compression of the spring by the load or road shock, within the radius of the swing of the torsion rods. Without this movement, there would be very severe stress upon the springs, both from road shock and from With it, the spring action is complete and tractive effort the torsion rods relieve the springs from the driving strain. This construction permits the use of the full elliptic spring, with the accompanying quality of suspension.

The front sale is a drop forged steel I section, 2.5 by 1.5 inches, with 1.625-inch diameter spindlers, and the rear sale is forged 1.75 inches square, with spindlers 1.75 inches diameter. The tiebar is placed behind the front sale for protection. The wheel hearings are Weston-Mott cup and cone, with balis of large size and adjustable to any desired point. The wheels are wood, artillery type, with 12 spokes 1.75 inches diameter, and a 25 inches diameter, being fitted with 33 by three-inch solid tires, with demonstable rims. The wheels and cuptoment are to the standard

adonted by the Society of Automobile Engineers.

The motor is the Westinghouse type V-50, strap wound, 80 volts, 30 amperes, with a maximum of 1500 revolutions a minute, and guaranteed to have 85 per cent. efficiency. It is suspended from the middle of the frame beneath the seat of the driver. The power is transmitted through a shaft, having two universal joints to the Jack-shaft, focated behind the battery hox, and then by the usual sprockets and chains to the traction wheels. The total reduction is nine to one and the vehicle's maximum speed is 12 miles. The Jackshaft is a Weston-Mott construction with annuiar ball bearings at the differential and Hyatt roller bearings at the oils of the driver of the project pearings at the oils of the driver of the project pearings at the oils of the driver of the project pearings at the oils of the driver of the project pearings at the oils of the driver of the project pearings at the oils of the driver of the project pearings at the oils of the driver of the project pearings at the oils of the driver of the project pearings at the oils of the driver of the project pearings at the oils of the driver of the project pearings at the oils of the driver of the project pearings at the oils of the driver of the project pearings at the oils of the driver of the project pearing at the oils of the driver of the project pearing of the pearing of the project pearing of the project pearing of the project pearing of the project pearing of the pearing of the project pearing of the pe

The hattery box is suspended from the centre of the steel chassis frame and is in reality two boxes, each containing two trays and 20 cells of nine plates each of the 40-cell Gould hattery, type T H. These batterles are guar-



Chassis of M & P 1000-Pound Delivery Wagon

anteed by the maker in cities in which there are representatives, to maintain a capacity on discharge for 4.5 hours. The catalogue rating is 5.5 hours.

The rontroller is the Westinghouse continuous torque type and the steering gear is a worm and sector with a 15-inch hand wheel. The service brake shoes expand within 14-inch drums on the rear wheels, and the emergency brake shoe expands in a 10-inch drum on the Jack-shaft, both being operated by pedais. All brakes shoes are two inches width. The lamps are inset in the dash and are protected from ordinary dangers of breakage. They have means for adjusting the focus.

It is maintained by the maker that the cars are constructed of standard products by makers of the highest repute, which is a guarantee of high quality of material and workmanship, and a certain insurance that the cost of maintenance will be relatively small.

G V BANK DELIVERY WAGON

Competition has impelled the banks and trust companies of the large cities to give attention to large customers which often entails the transfer of large sums of money, such an delivery of lay rolls, the daily collection of the receipts of stores and business houses, the transfer of securities, and the like, which could not be done by messenger without some probability of loss through carclessness or theft. Not only this, in the daily collections, with the banks closing at a stated hour and the desire to deposit as late as possible, it is desirable to have a service that will be expeditious and absolutely dependable.

An example of the utility of the electric vehicle is shown by the accompanying illustration, this being a 100-pound General Vehicle delivery wagon chassis, made by the General Vehicle Company, Long Island City, N. Y., and used by the Bay State Trust Company of Boston, on which is a steel body, that is designed especially for this particular service. The wagon is driven about with one or more clerks in the body in charge of the money or securities, and the transfer is made with absolute certainty against loss. The body will resids attempts to enter it without special tools for a considerable length of time, and it would afford protection against a loss.



Novel Bank Wagon on G. V. Chassis.

bery. This machine is in daily use and has given admirable satisfaction.

PHILADELPHIA STORAGE BATTERIES.

The Philadelphia Storage Battery Company, Philadelphia, Penn., specializes the Philadelphia "titin plate" hat-teries, this construction being possible with the "diamond grid" plate, which is claimed to insure unusually long life and highly dependable service. The "fish plate" development by this company may best be summarized by the statement made by it that in the period from 1986 to 1912, approximately six years, the weight of a hattery of stated capacity has been reduced from 35 to 22 pounds a cell unit, or about 10 per cent., and the kilowatt-hours capacity has been increased from 28 to 400, the intermediate steps being 235 and 375 kilowatt-hours. The number of plates has been increased from 11 to 13, 15 and 17, respectively.

Contrasted with thick plate batteries, which are claimed to yield from eight to nine watt-hours a pound, the Philadelphia this plate will yield from 14 to 15 watt-hours a pound, which as the mileage of a car is proportional to watt-hour capacity, demonstrates the efficiency of the battery by watt-hours. Another quality claimed for these batteries

is the unusually high jars and the depth beneath the element, so that as the active material is precipitated to the bottom of the jar this precipitate will not sufficiently accumulate to entail cleaning, save at long intervals.

Philadelphia vehicle batteries are made in bree types: W for service where great mileage is not essential; W M, with thinner plates and a capacity from 15 to 29 per cent. higher than 17pp W, and W T, which is claimed to give a mileage considerable greater than thicker plate batteries and a capacity of from 25 to 40 per cent. greater than type W, having very high discharge voltage and maintaining speed under all conditions. The plates of type W T are the double, diamond grid, that are guaranteed not to buckle.

Philadelphia portable storage batteries are made in sizes adapted for use in operating small motors, lamps, phonographs, or wherever a fairly high rate of current is required. The plates are the standard type W railroad signal batteries, are made with the standard S plates, of high ampere-hour capacity and with any number of cells For automobile ignition and lighting the batteries are of the double-grid type, similar to those used for vehicle service, improved to meet the special demands for this work. Three types of light batteries are produced, these being especially suited for automobile and motor boat use, but can be supplied of other voltage or higher ampere-hour capacity.

The batteries are assembled in rubber jars with rubber and treated wood separations, and are fitted with the forces of terminals, straps, etc., best suited for the purpose for vibich they are to be used. Where the batteries are cases they are senied with acid proof compound, and the hardwood cases have strape bandles for carrying.

The company makes broad claims for ita batteries as to design, material, construction, service and endurance, maintaining that these will be amply demonstrated under all conditions with intelligent use.

SECOND ANNUAL VEHICLE PARADE.

The second annual parade of electric service wagons took place in Boston, Memorial Day under the auspices of the Electric Vehicle Club of that city and the management of Day Baker, New England representative for the General Vehicle Company. The route was from Brookline avenue in Back Bay to the centre of the city and through the princloud streets, the line of 150 machines being led by Miss Virginia E, Alken, New England agent for the Babcock pleasure cars. The number was practically double that in the first parade, a year ago. Many of the machines were leaded and the parade was incidental to the work of the day. All makes and sizes of vehicles were in line and came in for decided attention from many thousands of spectators. Practically every electric vehicle agent or dealer in Boston and vicinity was active in the preparations for the arrangements and the conduct of the parade.

BOSTON ELECTRIC VEHICLE CLUB.

The Electric Vehicle Club of Boston, organized Airilet Vehicle Club of Boston, organized Airilet Airilet Airilet Vehiclet Club of Boston, and Interest Vehiclet Club at Research wagnon, ended its activities for the present seasons with a dinner at the New England Kennel Club at Brainter, Amas, June 5. The members of the club have bed weekly meetings since last September, at which addressee have been made by promisen authorities on haulage, and shave been made by promisen authorities on haulage, and has systematically and consistently bronght to the attention of the business men of New England the value of the electric machine for general transportation.

RECENT MOTOR VEHICLE PATENTS

Brown Electric Gas Lighter

An electric device for igniting the acceptance at the burners of motor car headlights, which differs from those of ordinary construction inamuch as it is adjustable, has been patented by Stewart Brown, Cheago. The resistance coil is incorporated in the base of the igniter which is equipped with a band for attaching to the burner. The securing member is insulated and carries a thumb screw and but for locking the device in the designed sosition.

Hoffman Chain Housing.

To secure efficiency from chains these members should be kept iclean and foreign elements such as dust and mud, excluded. Arnold P. Hoffman, William E. Hoffman and Elimer F. Altman, Minneapolis, Minna, have been granted a patent for a sprocket chain housing which is constructed in two parts and of which is calimed easy disassembling and reassembling. One section of the device is tubular in form and has a hell shaped mouth which permits flexible and telescopic movements between both sections of the device. The larger portion is constructed in sections, these having fiances for securing the parts, and packing is also provided to make the device of tight.

Hall Grease Cup.

James B. Hall, Cleveland, O., has been granted a patent for a grease copy utilizing solid lubricants. The interior of the device has a number of wires secured together for a a poperting stem and have portion of their length to form a supporting stem and have from the upper ording of the form the upper portion of the stem to conform to the out-room
Beam Radiator,

Accessibility and ease of repair in the event of accident

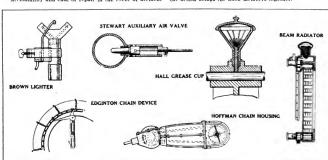
to the radiator are of value in the service of the commercial white and Jacob B. Heam, Punsantaware, Penn, has patented a cooler of this nature. It consists of a series of independently removable sections comprising upper headers communicating with the upper water leg and hearing against the bottom of said chamber and against the upper part of the front frame of the radiator, and lower headers restling on the bottom of the cooler frame. Vertical tubes connect the upper and lower headers and the lower water leg is setsetable.

Stewart Auxiliary Valve.

An auxiliary air valve designed for attachment to the intake pipe or manifold of the internal combustion motor has been patented by Alfred C. Stewart, Los Angeles, Cal. it consists of a cylindrical casing, one end of which is reduced and threaded to fit the manifold. This end of the device has a shoulder forming a seat for a movahic valve similar to a popert valve. Attached to the valve is an operating wire enclosed in a flexible housing which leads to any convenient point for service. All ris drawn in through apertures near the valve when the latter is moved from its seat.

Edgington Chain Tool.

William F. Edgington, Springfield, O., has been granted a patent for a tire chain tool which presents practical features, inasmuch as with the device chains difficult of attachment may be stretched taut, facilitating adjustment and locking. The tool comprises two levers, one of which is pivotally mounted and equipped with a payl which engages with the smaller member. Both sections are fitted with looks, these being designed to fit and engage between the links of the outside chain. When the lever is moved the action brings the hook members toxether.



Outlining the Efforts of Inventors Ainsg Lines of Interest to the Manufacturer, Agent and Owner of Commercial Vehicles.

KOEHLER CAR PRESENTS MANY NOVEL FEATURES.

DESIGNED by one of the ploneers of the commercial car industry, a thorough student of the transportation problem, whose experience has been wholly with industrial transports, the Koehler commercial car, being marketed by the H. J. Koehler Sporting Goods Company, 1709 Broadway, New York City, presents many interesting features. It is the creation of L. E. Schlotterback, one of the best known designers of mechanical transports, who conducted a series of experiments extending over a period of several years to determine the proper carrying capacity for a vehicle which would transport loads economically and still be within the reach of various industries, such as the grocer, expressman, department store, etc. Tests were made with various types of motor cars with carrying capacities ranging from 500 pounds to 10 tons and after a careful study of the problem Mr. Schlotterback decided that the 1600pound vehicle was best adapted for economical transportation of a load, regardless of husiness demands.

Panel Delivery Type of Rody, Providing Ample Room and Height Back of Driver's Seat. High Grade Finish and Upholatering Are Features of this Newark Product.

Although the Koehier commercial car is low priced the hest of material and workmanship is incorporated throughout and this is made possible through Mr. Schlotterback's manufacturing experience, production in large quantity and the utilization of modern machinery. The plant of the L. E. Schlotterback Manufacturing Company at Newark, N. J., is unusually well equipped for the production of these vehicles the entire output of which will be distributed by the Koehler company, Mr. Koehler is well known as one of the largest distributors of pleasure cars and his experience is such in the automobile industry that he is familiar with requirements of hody design and in addition to a large variety of standard types such as open flare board, canvas top, full panel, etc., the chassis of the Koehler will be fitted with special bodies built to order to meet the individual requirements of the purchaser.

Simplicity and Accessibility,

A striking feature, aside from its popular price, is the simplicity of construction and accessibility of components.

it being claimed that the most inexperienced can master lis operation in a very short time and that the mechanism is proof against improper use. It is also pointed out that its carryling capacity permits of the proper haul at the right price a load, thereby effecting economy, and that its weight makes for low cost of maintenance. Throughout, attention has been paid to small details, which with the use of high grade materials, provide a vehicle adapted for continuous and economical service.

The power plant is ample for the carrying capacity, the motor being of the two-cylinder borizontal opposed type operating on the four-stroke principle, and the bore in 5.25 inches and the stroke four. The rated horsepower in 22-24, although it is stated it will develoy condiderably more when operating at its maximum efficiency. The crankshaft is 1.875 inches in diameter, constructed of a high grade, leat treated steel, accurately ground to size and the bearings are of liberal dimensions, being 4.5 and 3.5 inches

The crankpins are 1.875 by 2.5. inches. The cylinders are of a high grade, close grained gray iron and these are ground to size, and ispped. The pistons and rings are similarly treated and heing carefully fitted insure perfect compression, a factor contributing to high efficiency of the motor.

The connecting rods are constructed of a high grade bronze and their bearings are liberal in size, being of bronze with genuine habblet tinings. The camebaft is of tool steel, with integral cams and these are hardened and ground to accurate size. Both the intake and exhaust valves are mechanically operated and are 2.25 inches in diameter, insuring liberal opening for the passage of the gases. A feature of the valves is their accessibility and ease of adjustment when necessary. The flywheel is bolted to a five-inch flange integral with the crankshaft, an arrangement facilitating the overhaul of the power plant. This is suspended on forged steel hangers from the maln frame, a construction making its removal

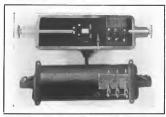
from the car an easy matter. Particular attention has been paid to the halancing of the motor, it operating with a minimum of vibration.

Lubrication and Cooling.

The lubrication system is a combination forced feed and aplash. There is a considerable oil reservoir in the base of the crankcase from which the lubricant is drawn by a grar driven pump and circuisted through tubes, whence it is delivered in streams into channels in the connecting rods through which it is distributed to the wristipn and crankpin bearings, and to the main bearings. The camshaft bearings, cylinder and piston wails, and the timing sears are lubricated by aplath. The oil is filtered as it is drawn from its reservoir.

Cooling is by thermo-syphon circulation through the motor and are large to secure efficient cooling under continued operation. The location of the inlet and outlet pieve of the radiator varies from conventional practice as both

are at the bottom of the cooler, so that the heated water entering the radiator must rise through the coolest of the fluid, quickly reducing the temperature. This arrangement



The Kochler Transmission, Clutch and Differential Are Enclosed in Oil Tight Housing Hung Transversely on Main Frame of Chunis,

provides for circulation so long as there is sufficient water in the radiator to fill the water jackets. The cooler is large and is suspended upon springs to eliminate vibration.

Ignition is by a Bosch high-tension magneto located on top of motor and driven by enclosed gears. A conventional type of float feed carburetor is employed, this being 1.25 inches and the intike pipes are liberal in size and free from bends, insuring easy passage of the mixture to the cylinders, The exhauts pipe is also of liberal area and passes to the muffler in the rear of the car in a straight line, reducing back pressure to a minitum.

Novel Transmission,

A straight line drive is noticeable from motor to a combined transmission and jackshaft, and aithough there is no angle the shaft is fitted with a universal joint. An innovation is the assembly of the clutch, transmission and jackshaft as a unit, these members being located in an oil tight housing installed transversely in the chassis, as depleted in an accompanying illustration. This housing is divided, and ono section carries the jackshaft, differential, clutch and transmission, these members revolving in a bath of indirectant. The transmission is planetary, and all gears are

of a high grade chrome nicked seech, hardened throughout. The shafts are a special alloy steel, ground to size, with bearings of phosphor bronze in semi-steel casings. The jackshaft bearings are ample in size, insuring perfect sligament, and operating in the oil tight housing are properly lubricated, reducing wear to a minimum.

The clutch bands for the low and reverse are semi-steel which cannot silp or burn, and the high speed clutch is cone. The shaft to which is attached the bevel pinton or driving gear, rotates in substantial bearings in a housing integral with the transmission caning. As the latter is anchored securely to the frame, it is obvious that perfect alignment is assured.

The entire construction of the unit makes for accessibility, as by detaching the chain and retaining members, and disconnecting the universal joint, the entire assembly may be

removed quickly and without undue effort.

Donbie Chain Drive,

The drive is by double side chain to sprockets on the craw theels. The sprockets are made of a specially selected material, cut carefuly and of large diameter. These are close together, permitting of the use of a short chain, which with the large sprockets allows it to roll freely while the shortness of the chain eliminates stretching.

The chassis frame is U shaped, of channel acction seel, three by 1.5 Inches, with curved end at the front, where it extends considerably beyond the radiator, forming a soild and serviceable protection against damage from contact with an obstruction. The cross supports are substantial and additional strength is secured by the fitting of a metal floor place of sturyd design, this connecting the frame sides. This floor plate is utilized for securing all controlling parts, climinating the many braces, holts and screws used with floor board construction.

Cast integral with this floor plate is the base of the vertical steering column. The steering gear is of the bevel platon and sector type with 16-inch hand wheel. Throttle and spark levers are mounted below the wheel and are accessible to the operator whose location is at the left with right hand control of the transmission and emergency lever.

Axles and Springs,

The front axie is a one-piece drop forging, 1.5 inches square with knuckle yoke integral. The rear axie is two inches square and both members are constructed of 40 point carbon steel. Special attention has been paid to wheels, these members being large, and both front and rear have 16 spokes of ample size. Two-inch solid motor side wire threa are utilized both front and rear and the designer points out that these dimensions, with the large wheels, are best suited to carry heavy loads with minimum upkeep expuses to the user, that they stand up better than additional tire section would on small diameter wheels of ordinary design.

Semi-dilptic springs are utilized in front and full ciliptic-rear, both being 1.75 inches. The rear members are securely fastened to substantial arms. Two sets of powerful brakes are provided, the service members being on the Jackshaft, metal to metal, with 75 square inches of braking surface and at a three-to-one reduction from rear wheels. These are operated by pedal. The emergency members are drums on the rear wheels, metal to metal, and of simple



curely to the frame, it is obvious Open Flare Board Express Body Fitted to Noebler 1990-Pound Car. The Radintur is Prothan perfect alignment is assured.

design. The wheelbase is 85 inches with tread standard. The fuel capacity is 16 gallons and oil, one gallon. Both tanks are located under the driver's seat and are substan-

tially constructed and very accessible. The speed of the vehicle is from four to 16 miles an hour on the high gear or direct drive.

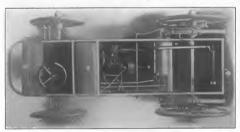
Low Centre of Gravity.

One of the noticeable features is the low centre of gravity or a chassis of this type. This permits of easy loading, and with all body designs the floor is but 36 inches from the ground. The weight is approximately 2000 pounds but varies according to the type of body.

Four standard bodies are supplied, these being an open faire board, express, canvas side and panel. The latter is made in two types, A and B. The open flare board type is large and roomy, the lands measurements being 41 inches wide and 84 long back of driver's seat. The flare boards are 17 linches above the floor. The body is strongly ironed throughout, also to receive a four post canvas top which is listed as extra.

The panel type A is adaptable for a highly finished delivery car and the inside measurements are 52 linches back of the operator's seat and 42 wide. From the bottom of the floor to the roof of the top is 52 linches. Type B is larger providing more space, the inside dimensions heing 84 linches back of driver's seat, 42 wide and 55 high.

The vehicles are highly finished and there is a wide variety of colors for selection. The panel A type has a



Chassis of Koehler Vehicle Depicting Location of Power Pinnt and Accessibility and Simplicity of Components,

maroon body with Prench gray gear while the body of type B is hinck, with gray gear. The carbas alice type has the body panel black. The lease line is New York red as in the gear while the under body is finished in ultra-marine blue. The open flare board and express types have the bodies painted ultra-marine blue with gear New York red. Black trimmings are utilized on all types.

The upholstery is deep and of the best grade leather. The driver's sort is detachable and a "lazy back" in fitted. Throughout the car the designer has made every endeavor to simplify, and special emphasis is fald upon the accessibility of the working parts and ease of operation. Designed to take the place of one and two-horse equipments, and to operate at a low cest, the Koebler commercial vebicle will appeal to those seeking a low-prired machine but embodying mechanical features of a light-prired vebicle.

NEW YORK TESTING TRUCKS.

New York City is experimenting with motor tracks in its street cleaning department for use in the removal of ashes and garbage, Commissioner Edwards having obtained an appropriation of \$10,000 to be expended in tests of auto-

mobiles. He has renered six, instead of purchasing any present, and there at present, and they will remain in commission until the close of the fixed year. I'nder the old system as the estimates that the cost to the city was about 55 cents of the remaining the commission of refuse, while under the new, he believes the cost will autorostine 22 cents at the new, he be-

CAPE COD PASSENGER SERVICE.

The first automobile sightseeling service to be Installed on Cape Cod recently started dally runs from historic Plymouth to Sandwich. A shore route passing through Bourndale has been selected, and the ear will take about two hours for its journey of approximately 23 miles. For the first of the season two round trips will be made each day. The car for the service is to seat about 20 passengers, who will be afforded an opportunity to inspect the operations on the line of the new Cape Fod canal.

LOCOMOBILES OPERATE ECONOMICALLY.

In the town of Easton, about six miles from Bridgeport, Conn., work is being pushed forward rapidly on the construction of a mammoth reservoir, which when completed with have a canactiv of 4.500.000.000 gallons of water.

> Playing no small part in this work which is being done by the Bridgeport Hydraulic Company, are two new Locomobile five-ton trucks, hullt by the Locomobile Company of America, with headquarters at Bridgeport.

The fact that the site was focated so far from the centre of the city and the railroad, access to which could only be made over country roads, made the matter of ransporting anpplies a problem for serious conderation. Horse drawn trucks were used at first, but this proving slow, it was decided to adopt motor trucks, which have now been in service for about two months, hauting cement, coal, machinery and other supplies from the railroad. Very satisfactory rosults have been obtained.

although the conditions have been far from ideal.

in the matter of hauling coal it was allown that one fourhorse team was able to make two trips a day to the proposed reservoir with a four-ton load, a total of 48 ton-miles
while the trucks easily made four trips with a 5.2-ton load,
a total of 122 ton-miles. Charging \$3.5-a day for a team
of two horses and \$2 for the driver, the cost for the fourhorse team, exclusive of maintenance, would be \$1.879 a
ton-mile, while the truck costs, allowing \$15 for all
charges, would be only \$1.137.

G. M. C. SAVES HALF OVER HORSES.

Officials of the Staf-O-Life Feed & Milling Company, New Orleans, La., are first believers in the advantages of the motor truck, and estimate that a G. M. C. five-fon machine, made by the General Motors Company, Detroit, Michsaves the firm annually 44206, It is used for carrying goods to the railroad and to city customers, and carries a load of 160 aseks, containing ii,000 pounds. It covers a distance averaging between 40 and 50 miles daily, consuming from seven to cight gallons of gasoline. The manager of the company says that the truck does the work at a cost a little less than 50 per rent. of the drawage by teams.

FIRE DEPARTMENT NOTES

CHRISTIE TRACTOR IN NEW YORK.

The New York life department has in service the first front-drive tractor built by the Pront-Drive Motor Company, Willow, Clinton and Lish steel, Holokett, Motor Company, Willow, Clinton and Lish steel, Holokett, J. J., this concern having as its execution and Lish steel, Holokett, J. J., this concern having as its execution of unusual ability. The tractor was placed in in commission last December and since that time it has been in commission last December and since that time it has been driven in response to all darks within its district, as well driven in response to all darks within its district, as well started, as well defined as being demonstrated at the desire of Commissioner Johnson and other officials for the benefit of visiting framem. This is, so far as is known, the first two-wheel tractor ever department purposes, and it is the only unguissioned in service in any municipality.

For years Mr. Christic built and drove racing cars in which the engine case formed the front aste and the drive was direct from crankshaft at hish speed. These machines were driven in this country and abroad. While all others accepted the application of the power to the rear wheels as found Mr. Christic was convinced he was correct in his belief and continued to devote binned to experimental work. The results were so satisfactory that the company was organized to produce tractors for any service with capacity up to 25 tons.

Examination of the accompanying illustration will also what the "gooseack" of the frame by which the bolier, engine and pump of the steam fire pump are supported is mounted at the rear of the tractor. The connection is rigid. Forward of this connection is the tractor. This type of tractor is driven by a 98 horsepower engine and so far as radius of movement is concerned it is limited only by the fuel supply. The tractor is very heavily built, to endure under all conditions of services.

An explanation of the principles is desirable because the

tractor in no way resembles the racine cars built by Mr. Christie. The power plant is carried well forward of the act. The tractor is mounted on two disc wheels and supported by a heavy dead act on which the wheels revolve. Above this is the live or counter acte, which is in reality a lackshaft. This jackshaft is fitted with a heavy spur gear differential and with universal joints at either ead which have a wide radius of movement. At the ends of the jackshaft are spur pinions which are meshed into internal gears contained within the housings of the tractor wheels. The power is transmitted through a gearset of the processive type, giving two speeds forward and reverse (high speed direct) and by a chain from the transmission shaft to the jackshaft, there being no change whatever in the relation of the engine shaft and jackshaft.

The universal joints in the Jackshaft and the knuckles and wheel pirots of the dead axle permit a 30-degree more and of the wheels by means of the steering wheel, the usual radial allowance for turning. There is a turntable on which the tractor is away by a worm general driven direct from the transmission gearset case, this being operated by a movement of the same lever that changes the speed ratios, and by this the turntable may be moved 60 degrees more, so that the wheels may be at right angles to the original path of the tractor. This will permit the engine to be turned in a circle with the rear wheel as pirots.

One of the most important features is the fact that when a turn is made under ordinary conditions of driving the tractor wheels are driven, but to make a sharper turn might be dangerous with the eagine driving, no that as the power is a applied to the turntable the clutch is automatically disconnected to the contract of the contract

The tractor is extremely business-like in appearance, and yet it is not unsightly. Its design is somewhat a de-



Christle Tractor, First Front Drivon Machine in Fire Departm ont Work, Made by Front-Drive Motor Company and in Service in New York City,



parture from conventional automobile practise. The engine of the first tractor, that which is seen in the illustration, is located longitudinally in the chassis frame, but the motors of all others will be placed transversely, which will be the type that has been described. The transverse motors will he carried relatively further forward of the axle, this change bringing about two results, the direct transmission by chain from transmission shaft to jackshaft, and the greater weight upon the forward wheels, which is especially desirable because of their tractive effort.

The engine is built for extreme service. it is a fourcylinder four-cycle type with engine case and transmission gearset case cast in a single unit, the case being semi-steel and having great strength and extreme simplicity. The bore is 5.5 inches and the stroke seven inches, with a maximum speed of 1500 revolutions, the rating by the S. A. E. formula being 48.4 horsepower. With the maximum speed the engine has 1750 feet piston travel a minute, which is 75 per cent, more than the basis for the S A. E. standard and with the ratio of bore to stroke of one to 1.27 the rating of 90 horsepower is not too high. The crankshaft is 2.75 inches diameter at the bearings and the bearings are 3.5 inches length, with annular ball bearings at the end of the shaft carrying the transmission. The clutch is a

by box gussets. This frame is carried on very targe springs instailed on the main axie, which is a 30 carbon steel forging, 2.5 Inches width and four inches depth, this axle also carrying the jackshaft or live axle with its beavy differential of spur gears of Krupp chrome nickel steel, and driving shafts of the same material with large universal joints. The wheels are of steel, the outer disc supporting the axle bearing and the inner carrying the large internal gear, 22 inches diameter. The wheels are rigidly mounted on annular ball hearings and are shod with solid rubber tires. The tractor brake is direct connected to the live axie and it is geared six to one on resistance. Besides this there is a brake set operating on the wheels of the pumping appa-

The turntable is one of the most ingenious devices of the apparatus, as it is motor actuated. The table is made with a frame that is holted to the chassis frame, this portion being of extra heavy angle steel and carrying the lower section. The upper section carries the "gooseneck" connection with the pumping engine. The turntable is locked in position until it is desired to turn in a sharper radius than is permitted by the wheel lock and then by moving the change speed lever into a specially arranged slot in the gate the power of the engine is applied to turning the table by



Pope-Hartford Combination Chemical and Hose Wagon Recently Placed in Service with the Department in Norwich, Cons. specially designed disc type, with cork inserts to insure certainty of clutching and ease of engagement. The drive from the clutch to the transmission is through a pair of spur gears. The transmission is with a ratio of reduction of six to one on high speed, 12 to one on low speed, and 14 to one on reverse, the high speed affording a variation of from eight to 30 miles an hour through engine flexibility. The transmission gears are of Krupp chrome nickel steel, heat treated and hardened.

The motor is lubricated by a combination force feed and splash system. The ignition is by a specially constructed magneto and by battery and transformer coil, two sets of spark plugs being used. The cooling of the motor is by water circulating through the water inckets and a large honeycomb radiator instailed in a pocket frame that is lined with leather to prevent strains and stresses, the circulation being by a pump of large capacity. A fan forces a strong draft of air through the radiator at all times. The carhuretlon is hy a special three-jet type of instrument, controlled by a hand lever on the steering wheel and a foot accelerator. The ignition advance and retard is by a hand lever on the steering wheel.

The tractor chassis frame is a heavy steel channel sertion with all the joints of the cross members strengthened means of the worm gearing. By this device the engine may be turned in its own length and can be handled under extreme conditions

The wheelbase of the tractor drawn engine is exactly the same as were it drawn by animals because the tractor is mounted with its wheels well back. Under the tractor steering wheel is a heavy chassis frame member which curves downward and carries the rack and pinion steering gear on the turntable, and it is connected with the linkage hy which the wheels are turned under ordinary conditions of driving. The steering or pivoting is the centre of contact of the road wheels with the road and the centres of the driving wheels, so that turning the tractor is comparatively саву.

The tractor steering wheel is at the right side of the tractor chassis and the hand lever is at the side of the driver's seat. On the footboard are the clutch and the service brake pedals and the foot accelerator. Under the seat is carried the gasoline tank, the feed being by gravity to the carburetor. With the manner of attachment of the steam fire pump the apparatus appears practically to be a single construction, instead of two separate units.

These tractors are to be huilt for all purposes and with industrial vehicles the speed will be somewhat lessened be-

THE MOTOR TRUCK



cause of greater reduction of the power. It will be possible to utilize different forms of bodies, for varying work, the exchange being a comparatively easy matter. The size of the tractor will depend upon the service for which it will be used.

POPE-HARTFORD FOR NORWICH.

The working efficiency of the department in Norwich. Conn., was increased recently by the installation of a new Pope-Hartford combination chemical and hose wagon, which was driven over the road from the factory of the Pope Manufacturing Company, Hartford, Conn. The car, which is illustrated herewith, is propelled by a four-cylinder, water-cooled motor rated at 56 horsepower, but capable of developing considerably more than this under test.

The body is fitted with seats running lengthwise, these accommodating a crew of eight men. The front seat provides for two more. The fire fighting equipment includes 1000 feet of 2.5-inch doubs jacketed water hose, and 35-gailon chemical tank with extra jar and holder, and connection for 2.5-inch fire hose. The tank is located fitting of a Perkins automatic lighting system, by which the searchlight, side and tail lamps may be ignited instantly from the seat by pushing a button. In common with other Knox vehicles of this type, it is supplied with siren horn, an ordinary automobile horn and a locomotive bell.

The car has attracted no end of attention throughout Massachusetts, it having been seen over the road from the factory in Springfield to New Hedford, whence it was taken to the Island by boat. E. P. Crocker, who will be the only lifenseed operator in Nantucket, has been at the Knox plant hecoming thoroughly familiar with the construction and method of operation. In addition to the Knox combination vehicle, the fire fighting equipment on the Island Includes two hand draw steamers.

DANBURY WITNESSING TESTS.

Danbury, Conn., is considering the purchase of a motor engine. Chief Thomas A. Lounsbury and Engineer Elmer H. Barnum, accompanied by the members of the fire committee, Alderman Michael A. Schweitzer, Councilmen Gilbert Horner and Charles A. Schoonver were recently



Knox Chemical Wagon Built for the Vantucket Department and the Only Mechanically Propelled Vehicle with the Right to Operate on the Island,

under the driver's seat, and a metal basket is provided behind the seat for 250 feet of chemical hose. In addition to this, a full complement of firemen's tools, a 17-foot extension jaider and a 12-foot roof ladder are included.

KNOX CHEMICAL FOR NANTUCKET.

Although the people of Nantucket, Mass., went to the leglelature some few years ago with a successful appeal for a special statute forbidding the use of automobiles on the Island, the city of Nantucket has purchased the Knox combination chemical and hose wagon shown in an accompanying Illustration. The car, constructed by the Knox Automobile Company, Springfield, Mass., was delivered on the island has month, and now enjoys the distinction of being the only mechanically propelled vehicle with the legal right to be operated in that territory.

The chassis is the regular 50 horsepower model to which the Knox company fits fire fighting apparatus. In addition to two 35-guilion chemical tanks and the necessary chemical hose, it carries 1500 feet of regulation fire hose and all the other usual fire equipment. One particular feature is the guests of the Victor Motor Truck Company at Buffalo, N.

7, where they witnessed the test of a Victor fire engine.

This was the same model as the one recently installed in Middetown, Comn, by the Victor concern, but considerably larger. An American-LaFrance engine, built for Pueblo, Col, and a Koxo engine have been demonstrated in Danhor.

AHRENS-FOX FOR DETROIT.

Detroit, Mich., placed an order four four pieces of motor driven fire fighting apparatus with the Ahren-Pox Fire Engine Company of Cincinnati, O., the latter part of May. The contracts call for three automobile pumping engines and one combination chemical eights and hose wagon. Work on the machines has been commenced by the Ahrens-Fox company. The Cincinnati flurs's bid was considerably higher than that of several other companies, but the rapid advancement in the effectiveness of its automobile fire engines had its influence with the department officials in Detroit. The Ahrens-Fox motor engines have attracted unusual attention of late, and fire chiefs in various parts of the country are visiting Cincinnati as a result.

FAIRHAVEN SEEKS CHEMICAL.

Fairhaven, Mass., in awakening to the need of motor driven apparatus in its fire department, and the proposition of installing a combination chemical and hose warpening access of about \$500 is being considered. Several content as the extraction and representation of the content of the content and the period of the purpose of bringing the matter before the next town meeting. Promoters of the petitions advocate the installation of a double-tanked chemical, so that one can be charged while the other is in use. The town would find by the adoption of such a piece of apparatus that there would be a great saving in the maintenance of the department, while the outrying districts would be protected better in every way.

AMERICAN-LaFRANCE FOR LEADVILLE.

A new American-LaFrance motor combination hose and chemical car made by the American-LaFrance Fire English Company, Emiria, N. Y., has been placed in commission at Leadville, Col. It is a four-cylinder machine with a 40-callon rate.

POPE-HARTFORDS IN CALIFORNIA.

The town of Corona, Cal., bas placed an order with the Pope Manufacturing Company, Hartford Conn., for a Pope-Hartford chemical and hose wagon. Among other California cities and towns which have installed fire fighting apparatus of this make are San Francisco, Berkeley, Venice, Santa Barbara, Santa Robarardino.

PIERCE-ARROW FOR CHIEF.

Chief Thomas R. Murphy of San Francisco, Cal., is to have a six-cylinder, 48 horsepower Pierce-Arrow car, made by the Pierce-Arrow Notor Car Company, Buffalo. The fire department of that city bought its first Pierce-Arrow in 1910, and the service which it has given has been so satisfactory that when it was decided to add another, it was believed best to get one of the same make, despite the fact that its price was nearly \$900 more than other competitive bits.

PERU WANTS EQUIPMENT.

Attracted by the success of motor driven fire-fixhing apparatus in Indianapolis, Peru, ind., is considering the purchase of one or more pieces. The department officials are making a thorough investigation into the cost of operation and maintenance, and atthough nothing absolutely definite has been decided upon, it is very probable something will be done in the matter in the very near future.

LADDER TRUCK FOR NEW YORK.

An automobile fire truck with a 75-foot ladder recently had a test in New York City before Fire Commissioner Johnson and Deputy Commissioner Olvany. The result is claimed to have been satisfactory and the machine will probably be accepted for the city. The truck was made in St. Paul, weight 13,500 pounds and costs 311,500. The trial showed it capable of making 20 miles an bour. If accepted it will be the first one in service in New York City.

WEBB DOES EFFICIENT WORK.

So efficient was the work of a Webb automobile engine, made by the Webb Motor Fire Apparatus Company of St.

Louis, at a recent fire in New Haven, Conn., that there is talk of eventually providing all the companies in that city with similar apparatus. There was a time when the members of the fire department and citizens in general were skeptical concerning the ability of the engine to cope with a bad fire, but this feeling has passed. As a result of a revent claim the Webb engine pumped for 11:11:00; some of the time at the rate of 800 gallons a minute, feeding two streams of 500 feet each. After the blaze had been extinguished the engine was set to work pumping the water from the ruiss, working with as suction pipe, fitted with strainers.

TO PROTECT OUTLYING DISTRICTS.

Chief Dahill of the fire department in New Redford, Mass., advocates the installation of an automobile truck at the central house in hia city. Under the present conditions the horse drawn truck is obliged many times to make runs of two, three and even four miles to the mill and outlying districts. By having an automobile at the central station and placing the horse drawn apparatus in one of the outlying stations Chief Dahill points out that the city would be covered more efficiently and economically.

MONTREAL REPLACING HORSES.

The W. E. Sengrave Company of Walkerville, Ont., is building an elaborate equipment for the Montreal fire department, a considerable part of which will be in use within a month. A motor engine, ladder wagon and hose wagon will first be installed at headquarters, Craig street. Later some of the other horse drawn equipment in the city will be replaced by automobile apparatus.

KNOX AND AMERICAN-LAFRANCE.

The Knox Automobile Company, Springfield, Mass, and the American-LaFrance Fire Engline Company, Elmira, N. Y., recently secured contracts from the city of Pitisburg, Penn, for supplying six pieces of motor driven fire flighting superatus at an aggregate cost of \$31,500. Each concern received a contract for three machines to cost \$5250 each. Mayor William A. Magee and Director H. B. Oursier of the department of supplies appeared before the finance committee of the council in behalf of the successful bidders.

TRUCK FOR ST. JOHNSBURY.

St. Johnsbury, Vt., ls to purchase a motor fire truck. The city wants a 70 horsepower machine, guaranteed to make any hill in the village at about 48 miles an hour, for which it is to expend \$5890. The town wants the truck ready for use Aug. 1.

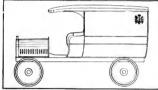
IN THE MARKET.

The following cities are contemplating the purchase of motor fire apparatus: Cincinnati, O., bond issue of \$180-,000 recommended; Waltham, Mass., appropriation of \$8009; Alameda, Cal., engine, and book and ladder truek; Santa Clara, Cal., combination citemiesi and bose wagon; Anaeconda, Mont., hose and chemical wagon, and aerial truck; Dallas, Tex., pumping engine and two combination wagons; Hingham, Mass., combination and chief's wagon; Somerville, Mass., appropriation of \$4800 for combination and chief's wagon.

ENCLOSED DELIVERY WAGON BODIES.

Equipment Designed to Meet the Requirements of Widely Varying Service, in Differing Sizes, and Adapted for Year-Round Work.

I T is a fundamental of engineering that a structure must be solidly supported to endure, and what is true of an immovable object applies equally well to what is movable.



Type A, a Full l'anet Body, with Open Scat and Hood,

That is to say, that any vehicle, as is any other structure, is constructed to carry a certain load, and if that load is is constructed to the retrieved that it is carried with relation to the construction then atreases are caused that are not always provided for. As a matter of fact any vehicle is supported to sustain a certain proportion of the weight of the whole. This primarily applies to the chassis. When the body is installed there is a fresh distribution, and as the wagon is loaded the weight is varied as the load is placed. Directly the mechine is driven the variance in the surface of the highway issues no rincreases the stresses proportionate to the elevation or depressions, to the speed and to the flexibilities of drives.

Of course any motor wagon is expected to be worked under differing conditions and what is supposed to be a safe margin of strength is provided for in the construction, but every failure is due to inequality of stress, insufficient or faulty material, or poor workmanship. Foor workmanship is a condition for which the builder is entirely responsible, and the same may be said of insufficient material, but a defect that will defy inspection may exist and only be developed after a considerable period of use. Inequality of stress is dependent upon the judgment of the driver and may be due to conditions that might be avoided or lessened through care.

With the cheaper forms of vehicles it is not to be expected that the design has been as carefully developed as with those higher in price, and neither is it to be assumed that the same quality of material is used. It is true that lightness may not necessarily mean a sacrifice of atrength, provided the metal is well choosen, but reduction of proportion of a standard can only he met by the aubstitution of quality that will compensate for the difference in weight. But whatever the design and whatever the material it is certain enough that limitations have here established, within which it is reasonable to assume the construction will endure with not more than normal deterioration.

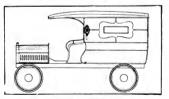
The need of limiting a load carried by a vehicle to the capacity fixed by the manufacturer is a subject that seemingly permits of no argument. Every practical man will acknowledge this, yet with this fact emphasized from every angle these men will tolerate, and perhaps exact, their employees carrying loads in excess of the limit established.

They will assume that ail work that can be accomplished beyond the normal standard in clear gain. Strangely enough beyond the normal standard in clear gain. Strangely enough they will believe what common sense dictates cannot be possible. Not only this, they will constantly overload a vehicle and believe they are "setting something towards or ing", but they are discovered they are declared to be in ing", but they are discovered to the stranger of the chassis maker, largely, if not wholly, because of the guarantee as to service.

In one sense a limitation of capacity is the prime reason why the owners and drivers purposely exceed it. The designer has made all his estimates of strength on constantswhere the vehicle is idle and the load equally supported. To these he adds what in his judgment will be sufficient to afford the factor of safety desired. The stress cannot he computed; neither can the character and quality of the metal be insured. Standards must be accepted and relied upon. These facts are not considered by the owners. While they desire the protection of the vehicle guarantee they generally invite or precipitate wear or damage by deliberately violating the conditions of the guarantee. As a matter of fact it may be justly maintained that these men, were there no guarantee, would be quite as careful not to overload their machines as they are generally as desirous of overloading them.

Theoretically body construction ought to be quite as carefully worked out as to engineering details as is the chassis. Even greater care would not be injudicious. Each body abould he so constructed that the load could be equally distributed and with a certain centre of gravity, so that there would never he more than a specified weight upon any given support. Obviously as the height of the load is increased the centre of gravity is raised and this means that the lines of support are changed correspondingly, casing stresses upon the construction that were not provided for, and which may be excessive.

Body builders of experience helieve that each body cought to be constructed for the work that the vehicle is to do. That is, the freight to be carried is to be measured as to bulk and weight and a design made that will permit merely the maximum load. Such a body may be large or small as the work will necessitate. To illustrate, a truck body was recently made for the Caracyte Steel Conspany for the haulage of steel billets, but while the load was six tons the body was a few six usually installed on a three-one



Type B, a Fall Pauel Body, with Open Stanhope Seat.

chassis, with, of course, heavier construction. The value of this equipment was that it concentrated the load and insured better distribution, and it guarded against overload-

ing. The wisdom of the small installation is apparent. At the other hand the truck that is to carry a light hulky load may have a hody considerably in excess of the standard.



Type C. a Pull Panel Body, with Half Vertical Panels.

By standard body is meant the size accepted by huliders as being adapted for certain works, that is, where the freights may be decidedly varied. For specific work capacity is determined by the weight of the freight a cubic foot. For instance, sand will weigh approximately 100 pounds to the cubic foot, contracting material about 3500 pounds to the cubic yard, brick 2700 pounds to the cubic yard, hituminous coai will require about 34 cubic feet to the ton, anthracite coal 36 cubic feet to the ton, and so on, If packages are to be carried the weight and bulk are figured and the body space designed that will provide for the chassis capacity. Small, heavy hoxes or cans may require but a small part of the body constructed for carrying larger and lighter units, and these may be carried in the larger vehicle quite as economically and as safely, provided they are properly loaded, but it is apparent that unless the weight is equally distributed serious damage may be wrought

For the purpose of illustrating the sizes of bodies regarded as standard the following statement of floor areas

Load Capacity	Length	Width	Floor Are
Pounds.	In.	In.	Sq. Ft.
1000	96	51	36
2000	108	5.6	4.2
2000	120	66	33
4000	126	70	611,25
6000	141	72	7.2

Taking these as the recognized sizes it will be seen that there are not distinct ratios of floor area to capacity. In fact the comparisons will abow the following interesting figures, taking the 1000-pound body as the basis:

Load Capacity	Floor Area	Increase P. C.	Increas P. C
1000	100		
2000	116.66	100	16.66
2000	152.70	200	52.70
4000	167.36	244	67.36
6000	200.00	500	100.00

By this it will be seen that the 6000-pound body is constructed to carry that weight, assumedly, but it has only double the space to carry fave times the load, which means that the vehicle is expected to convey packages or articles that weigh 2.5 times as much a unit as the 1000-pound wagon, to maintain uniformity as to load in both. In other words it is seeminely assumed that the greater the weight carrying capacity of a wagon the bulk is decreased. Were this so there would be a specific restriction as to height of load, but this is not defined unless in the case of the closed body. It may be said that the fully enclosed body is the only form that will limit the bulky load, while it will not be an poorty loaded as the open equipment, where the freight may be packed or piled on at either sides or ends.

Considering several forms of standard covered bodies it will be noted that these are made to specifications adopted after long experience with vehicles, and these are designed to afford the greatest measure of serviceability within certain limitations. These will be designated, for the purpose of consideration, as types A, B, C, D, E and F. Type A, for instance, may be built to any dimensions, saide from the standards, and yet to meet the average requirements the standards sizes will be as follows:

	Hody				
Capacity, Pounds	Area, So. Ft.	Length, In.	Width,	Height,	Capacity Cubic Ft
1000	36.00	26	51	60	180
2000	42.00	108	5.6	64	224
3000	55.00	120	66	66	225
4000	60.25	126	7.0	68	348
6900	72.00	144	72	70	420

Type A bodles will, according to the above tabulation. he identical in every respect save the proportions, and these may be fitted to any vehicle chassis in which the load as it may be distributed will not cause an excess stress. The design is known as a full panel hody with an open seat and bood. It is a graceful appearing construction that may be utilized for delivery of all manner of commodities of average bulk and weight, but obviously not one of these could be economically employed for the haulage of furniture or similarly light but bulky commodities. That is, the body could not take the load that ought to be carried to ensure a reasonable profit through haulage. For such work the open vehicle is undoubtedly the better, but for the aliaround delivery, which may be made without regard to the weather conditions throughout the year, the enclosed body is decidedly the better. There is the difference in cost, to he sure, and the appearance of the enclosed body is something that is of considerable importance, so that the expense of maintenance (finishing and repairing) as well as cleaning, would be larger than for the open equipment. But the other qualities more than offset the additional expenditure

This type of body may be installed on the comparatively light chassis and utilized for delivery by the florist, the laundry, the cleaner, the furrier, the department store, the milliner, the clothier, the shoe shop, the haberdander, and the like, while the larger sizes could be utilized by other businesses where there was desire for the advertising value and the prestige of modern methods, as well as the protection against loss and theft that is insured by the rear doors and a lock when the driver is left unattended. Bodies of from 2000 to 6000 pounds capacity could be utilized to admirable advantage by department stores and these would have sufficient capacity to make delivery of a large number of packages, being especially adapted to long routes, where many hundles are carried and where a driver and one or two helpers are necessary.

It will be noted that this body is built with plain, long



Type D, Pinin Full Panel Hody, with Oval Lights, panels and the lines are generally straight or slightly curved. The panels are of a size and form to permit attractive ornamental lettering, that illustrated being a dem-

onstration of the possibilities in this direction. There is a dignity and consistency in the design that is appropriate to a business of repute.



Type E, a Patt Curved Panel Body, with Open Sent.

Turning to type B a body is shown that is designated a full panel, with an open stanhope seat. There is practically no difference in the size or the capacity of the carrying space, but it will be observed that with this the single upper side panel of type A has been replaced by four smaller panels and in the centre is a wide frame in which is set a single light of heveled-edge glass. The side panels of the seat have curved lines to produce the stanhope effect, and the contour of the brackets supporting the hood are more pronounced, though the hood itself is practically the same. The high side jamps of coach design enrich the appearance of the entire construction. This hody is made in the same sizes as is type A. It is adapted to the same uses but perhaps would be in lesser demand because of the more generally ornate appearance, while its greater cost would be a considerable influence against it with those who gauge their expenditures by initial economy.

Referring to type C, is found a design known as a full panel, with vertical haif panels. The effect of this, which is ordinarily built for 1000, 2000, 3000 and 1000 pounds capacities, is decidedly a contrast with the two types previously referred to, but as a matter of fact the load space is precisely the same as for these. This is due to the large upper panel, the narrow panel beneath it, and the shortening effect of the seven vertical panels. The square lines of the seat panels and the helpth of the side rail, with the pillars supporting the canopy, and the shortening of the bonnet or hood all convey the impression of length. This form of hody is as well suited for the same classes of deliveries as are the others, but it must be treated with an entirely different form of ornamentation to obtain the same character of attention possible with them.

In type D is seen a full plain panel body with the side panels carried forward to form the sides of the driver's seat, this affording the driver more shelter than any of the others. The brackets that support the canopy are incorporated with the side panels, as are the seat panels, the forward ends of the side panels having curres that are emphasized by narrow mouldings. The driver is given a view at either side by larce oval lights, well above the seat, these being set in plain but substantial frames. Aside from this there is no ornamentation save the large side handle beside the seat, there is no commenced to the state of the side of the seat of the side are used to display the name and business of the owner. Type D is made in the same sides only as are type C.

The type E hody is the smallest of the series, this being hullt with capacities of 1000, 2000, and 3000 pounds. The design is specified as a curved panel body with open seat and long extended hood. The panels of the body are with straight lines until the seat is reached, when the since of the seat panels and the brackets supporting the hood are curved with graceful effect, the sides of the seat being ornamented with handsome hand rails. High at either side is mounted a lamp that give a pleasing relief. There is abundant sidview for the driver. The rear of the hody as designed is closed by a curtain. This equipment is intended for allaround service.

The body litistrated as type F is standardized, as is type E, to 1000, 2000 and 3000 pound capacities. This is also a full panel design with an open shield seat. This construction is severely plain and yet the forward end is artistically conceived, the curves of the upper seat panels harmonizing with the brackets supporting the canopy, and wide mouldings sweeping from the hood and after dividing the seat panels, rising to finish the forward edge of the upper panels. The lower panels are established by curved upright mouldings, the forward ones embellishing the forward edges of these panels. The rear doors have small lights at the tops.

Contrasting these bodies it will be realized that while all are classified as panel designs, there is a surprising difference in appearance which would not be understood even when the qualifications are noted. Emphasis is made of this fact beause it is decidedly improbable that the average owner of a rebiele could, without explanation, understand how six bodies, for instance, would have the same capacity and yet differ so much. The trade designation does not convey the impression that is necessary to differentiate the types. It is apparent that any one of these might be appeared by the same capacity will be also be made to serve, and there is a ufficiently wide range in design and capacity to satisfy all ordinary requirements. The more the types are studied the possibilities for adaptation are increased.

It will be noted, further, that with these standard bodies it is desirable that they be inatalled on chassis where the load is distributed according to the requirement of the designer of the chassis, and that it would be decidedly unwise to select a body without reference to the chassis design and its requirements—that is, to purchase a chassis and expect to install any body desired, Neither should there be an opinion that a body can be bought that will afford the necessary character of service that can be installed on any chassis. The chassis and the body must be consistent to obtain the best service within the limitations of the chassis.

CARTERCARS FOR MILWAUKEE.

The Milwaukee fire department has ordered through the Chicago branch of the Carterear Company, Pontiac, Mich.,



Type P, n Full Panel Body, with Open Shield Sent. seven model R roadsters. These cars will be used by the department chiefs in responding to starms and will add much to the efficiency of the department.

TRUCK NOTES OF

SPECIAL LACRE BODIES.

Particular attention is being paid by the Lacre Motor Car Company, Ltd., Letchworth, England, to the matter of special hody equipment suitable for municipal service of a class somewhat different to that obtaining in this country. Herewith are presented the detailed sketches of a set of bodies adaptable to the four-ton chassis made by this concern, the idea heing to supply the city government with wagons adaptable to various kinds of work, even where it is thought desirable to own hut one chassis. It will be noted as well, that the company provides a so-called roller platform designed to aid in the easy and rapid removal and replacement of the various bodies. Although designed to be applied to the four-ton chassis, as stated, it may be added that these bodies can he obtained for other sizes of Lacre chassis, and their capacity may be varied to suit the needs of the purchaser.

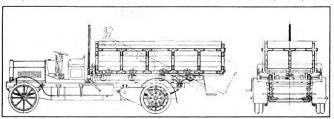
In the first place, it may be well to call attention to the new Lacre chassis, in which the long experience of the company has been reflected in the effort to obtain a vehicle that may be handled satisfactorily by unskilled drivers. in

crankshaft and a simple and efficient gauge on the dash informs the driver as to the condition of the supply at all times. The oil pump and strainer are easily detachable, being complete in a single unit and helted to the hase of the sump.

The crankshaft is of special high grade steel, and the camshaft and wristpins are case hardened. The camshaft and cams are cut from the solid. The inlet and exhaust valves are located on one side, the tappets and guides being wholly enclosed by removable dust proof covers. Ali valves are interchangeable and all tappets adjustable. The vaives are made of nickel steel and are of specially large dimensions. The ignition on all models is fixed, the current supply being a Bosch high-tension magneto.

Cooling is effected by a large centrifugal pump driven off the governor shaft and very accessibly mounted. The water is circulated through a vertical gilled tube radiator of large capacity, and the fan, directly behind the radiator. is helt driven, provision being made for adjustment,

The cone clutch is leather faced. The drive to the gearbox is transmitted through a special form of enclosed spring drive, which is held to be particularly efficient.



Side and End View of Standard Dumping Hody, Hand Operated, I illied with Municipal Combination Equipment Fitted

noted, the vehicles following designs which have been proved under all conditions of service. The motor is a four-cylinder, water-cooled unit, having

bore of 3.5 Inches and stroke of 5.5, giving a 20 horsepower rating under the Royal Automobile Club's formula, which is essentially the same as that adopted in this country by the Association of Licensed Automobile Manufacturers, and now the standard of the Society of Automobile Engineers.

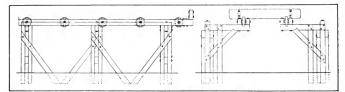
carrying out this plan, no startling innovations are to be

Revolutions are limited to a maximum by a heavy type centrifugal governor, which is driven off the haif-time shaft and is located in the top portion of the crankcase, the governor itself being easily accessible through an inspection cover. The lower portion of the crankcase is merely an oil pump, and contains the oil pump driven by spiral gearing off the camshaft. Provision is made for removing the sump without disturbing the main crankshaft bearings, and these latter can be taken up without removing the engine from the chassis

The jubricant is forced to the main engine bearings and connecting rod big end, through oil ducts drilled in the Three speeds forward and reverse are provided, and these are engaged by means of dog clutches, except the first and reverse. Final drive is by side chains. The differential mechanism on all Lacre models includes two crown genra

Special attention has been paid to the efficiency of the hrakes, the foot brake operating on a single drum fitted on a substantial extension of the differential shaft, and the hand hrakes, internal expanding, operating on the resr wheel huhs. The shoes have detachable cast iron slippers, which can be renewed readily and without excessive cost. The chassis also are constructed with an exceptionably large wheel lock, so that they may be turned in a remarkably small radius.

The dumping body, shown herewith, may be regarded as standard. It will be noted that the lower structure and tipped gear are fixtures on the chassis itself, and while they may not be needed with some of the bodies which may utilized, this is considered the most practical pisn. This lower structure includes the roller device, by means of which the bodies are transferred to and from the chassis. it may be added that the body is retained in position when



Rotter Pintform Furnished with Set of Bodies Designed for Varying Manicipal I see, Indienting Means for Changing the Units,

on the road by swivelling ciamping screws on either side, and retaining pins in front, which comprise a rapid and effi-

The roilers run in angle Iron guides fitted to the bottom of the body, and as similar roilers are fitted to the platform that receives the body when not in use, it is apparent that interchanging is a simple and easy matter. It is pointed out that the work is accomplished by hand with a minimum of effort in from 10 to 15 minutes, without the aid of a crane or tools of any kind. The roiler platform is so arranged as to he at the same height as the chasses platform, facilitating the removal and replacement of the body.

The dumpling hody has a capacity of 153 cubic feet, capable of being tipped by hand to any angle. The sewage disposal body has a capacity of 112 cubic feet, or approximately 730 gailons. It is built along lines similar to those utilized as horse wagons in this work, and the fitting of the elevating hoist makes it possible to tilt the tank to any position, so that the entire contents may be empired. Baffer plates on the inside tend to stop the sway of the liquid when the vehicle is a in motion.

The water tank has a capacity of 800 gallons, and is equipped with a sprinkling attachment, as well as apparatus for flushing the gutters. The valves for operating the sprinkling device are conveniently placed at the driver's seat, making it unnecessary for but one man to accompany the car on the road.

Other bodies may be fitted, among which may be mentioned a combined sprinkling machine and street sweeper, etc. All are constructed throughout of high grade material and the design follows the best engineering practise, having in mind the work which they are expected to perform.

INTERESTING GARBAGE WAGON.

For the past six months, Rouen, France, has been using successfully a motor truck, which has a four-fold purposethe collection of house refuse, street watering and washing, and to give assistance in case of fire in pumping out flooded buildings. The city has entirely done away with the use of horses in the collection of garbage, street washing and watering, and has found that the work is done more quickly; that there is a need for much and that there is a great saving when a comparison is made with the old method.

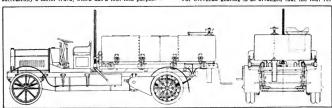
Rouen is really a pioneer in this line, and while other European cities are healtaing, the work goes on in the French city at a great saving of time and money. Through an arrangement with the firm of Harle et Cle, of Paris, city employs a fleet of eight motor vehicles, these being sufficient for all requirements.

In France each apartment house is provided with a common bit for refuse, these being placed on the sidewalks in the early morning and emptied into the scaveners's cart. As the bins are placed at intervals of 10 to 15 yards, it was a problem at first, on account of the slow speed necessary, to have them emptied into a motor truck. Paris has experienced this difficulty, which it has sought to eliminate by the use of electric chassis, but Rouen overcomes the trouble in a much different manner.

Here the motor trucks are provided with eight receiving bins, carried in a double row on a special body, with provision for lifting them on and off the truck by machinery. Each bin has a capacity of about 280 cubic feet, and at night the trucks leave them shout the city at specified places.

They are received by laborers, placed on wheelbarrows and a house-to-house collection is made for the refuse. After the household hins have been emptied, the hoppers are left at the edge of the sidewalks at an appointed stand. The work is carried on all night all over the city, and in the morning various street corners are lined with bins waiting to be collected and carried away. That the saving may he as great as possible these must be collected with little waste of time and with a minimum of manual labor.

The overhead gearing is so arranged that the four ref-



indirating Detailed Construction of Sewage Disposal Body, One of the Municipal Units Employed with the Latest Lacre

use carriers on one side of the body can be handled all at a time or singly as the operator desires. Although apparently complicated, the operation has been so simplified that it can be handled by one man, who can control the entire mechanism if necessary. It is usual, however, to carry two men on each truck, the second one to hook the hins to the cearling.

The loading and discharging mechanism, consisting of two steel columns, united by a fixed cross girder and a morabile transverse member to which the blus are attached a morabile transverse member to which the blus are attached and the control is through the usual change speed lever, and and the control is through the usual change speed lever, one there being six goar postitions—four for forward speeds, one to either adds, and the hins may be placed at variable distances from the edge of the curbing within certain limits. At the furnaces, where the refuse is destroyed, a specially constructed travelling crane has been installed to handle the bulbs. This is in charge of one crane man and an attendatu.

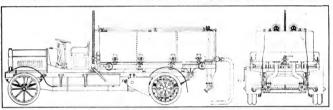
The entire rear of the vehicle is occupied by two permanent shallow water tanks with a capacity of about 550 gallons, making the truck serviceable as a street sprinkler and and separate in order to provide for the driving are made separate in order to provide for the driving mechanism of the permits of the use of one discharge and one pipe which permits of the use of one discharge and one of the driving the driving the driving the provide for the driving the pipe which permits of the use of one discharge and one of the driving district, travelling from 800 to 900 miles a week had missed but one train in the three years that it had heen in operation. Impressed with the possibilities of a service which would collect milk at their doors and deliver it in Leeds, the farmers left the meeting to consider the advisability of forming a co-operative society for the purpose of purchasing a van and maintaining it in service.

VANCOUVER BUYS FIRE APPARATUS.

Vancouver, B. C., has placed in service as 85-foot Webb motor aerial hook and ladder truck, built by the Webb motor Fire Apparatus Company of 8t. Louis, Mo. The same clicity has awarded a contract for two 80 horse-power, air-coled tractors for pulling staam engines, one 50 horse-power, air-coled chemical engine and one 50 horse-power, air-coled chemical engine and one 50 horse-power, air-coled combination chemical and hose car to the Seagrave Company of Columbau, 3nd hose car to the Seagrave Company of Columbau, 5nd horse-power, air-coled combination chemical and hose car to the Seagrave Company of Columbau, 5nd hose car to the Seagrave C

SAMPSON IN MANITORA.

The largest motor truck ever used in western Canada was recently put fine commission by the Manitoba Government Telephones. It is being used for hauling reels of cable and for doing other heavy work around the eight of Winnipeg. The new truck is a five-ton Sampson, built by the Alden Sampson Maniteduring Comman, a constitution



Side and Rear View of the Watering Tank and Street Finshing Equipment interchangeable with Other Bodies on Lacre

hehind the steering wheels. They can water a street 50 feet wide, and are provided with valves, operated by the driver, so that they can be shut off partially or entirely as the case may require. The pump may be driven when the truck is in motion or at a standstill.

The trucks are shod with steel rimmed wheels, rubber being considered to expensive, and everything is made to withstand wear and tear. Aluminum has been done away with almost entirely, the crank chamber and gearbox being of honze and the differential housing of cast steel. The motor is a four-cylinder unit, 105 mm by 150 mm, bore and stroke, with its cylinders in pairs. Ordinarily henrol is the fuel employed, although gasoline can he used.

VANS FOR MILK COLLECTION.

Farmers in the Yeadon district of England are considering a proposition to transport milk by motor vans from their farms to Leeds, the leading distributing point in that vicintry. A meeting of 20 of the leading milk producers in that district was held recently, when the subject was discussed. Many of the farmers showed considerable surprise when told that the expense of running a motor vehicle loaded is very little different to what it would be to operating an empty one. As an example of what motor propelled vehicles can do. It was pointed out to them that a mail van in the of the United States Motor Car Company, with headquarters in Detroit. It is equipped with a power winch for hoisting the immense reels of cables onto the platform hody.

G. M. C. AGENT IN WINNIPEG.

Negotiations were recently completed by Walter Jackson of Winnipeg, Man, whereby he hecomes the western Canada agent for the General Motors Truck Company of Detroit and New York City. This firm manufactures the G. M. C. commercisi cars. It is stated that Mr. Jackson may establish a renting business for those firms who need haulace only a part of the year.

MOTOR SERVICE IN VENEZUELA.

The Venezuela government has given to J. M. Alamilla Ramos the exclusive right for 20 years to transport freight and passengers by automobiles or steam motors between San Felix, Upta, Guasipail, El Callao and Turemore. He la to be allowed the present wagon road and must keep it in repair. The ordinary traffic by carts and mule trains is not to be disturbed. The free entry of machinery, tools, fuel, vehicles, etc., which the enterprise will need, is granted by the government. No national taxes are to be imposed, and the enterprise shall also be privileged to use what national

land it may need for huidings and to cut timber along the right of way for the repair of bridges, etc. The service is to be installed within a year after the approval of this contract by congress. The address of the concessionaire is care of Hotel Klindt, Caracas.

MALAY FREIGHT TRANSPORTATION.

The subject of transporting freight by motor vehicles in the Maiay states is being considered by a syndicate. It is the inspettion at first of placing in commission a five-ton to vehicle with a speed of from 10 to 12 miles an hour or to lower. It will be put to do the work now being done by ballock card, and to compete with them. The syndicate in an an effort to learn if the work can be done any chapper in this manner, will experiment with one car first, and if it is this manner, will experiment with one car first one of the syndicate in its is found successful, others will be added. The roads in the states are said to be in fairly wood condition.

OPENING IN CANADA.

That there is a broad field for the American made motor vehicle in British Columbia and Canada seems the natural conclusion to be drawn from recent orders placed with manufacturers in the United States from Vancouver, Monireal and Toronto for fire fighting apparatus. Residents in these sections in many instances have taken readily to the American pleasure car, but there still appears to be many opportunities, especially in the fruit growing regions of British Columbia and the agricultural districts of the great northwest of Canada. The introduction and application of motor tracks to these sections will readily follow on demonstration of their advantages.

ALBION SENT TO MALAY STATES.

A combination passenger and freight carrying vehicle was recently shipped to the Pederated Malsy States by the Albion Motor Car Company, Ltd., of Giasgow, Scotland. The chassis is of the makers 16 horsepower type, and is fitted to a particularly constructed hody, designed to carry passengers on the top and ice inside. The truck is the first of several of the same general plan to be operated in public service in the Malsy states.

GERMANY PRESENTS OPENING.

The bureau of manufactures at Washington, D. C., has a report from its consul in Germany, in which it is stated that a firmshankers and sesseral merchants in considering the control of the control of the considerable production of the considerable profit in the undertable. The three who explain in Germans was the considerable profit in the undertable, and there we have been considerable profit in the undertable. The vehicle must be of simple construction and must be an exact that it can take a number of severe grades with little difficulty. The high control gasonies in that part of the world should be taken into consideration by prospective bidders. Copies of the complete report of the consul, containing other details, can be secured from the bureau by interested manufacturers.

FIRE APPARATUS IN ENGLAND.

A number of English townships are considering the advisability of motorling their fire departments. Bournemouth has accepted, conditionally, the tender of J. Morris & Sons, Ltd., for a motor fire englier, and application is to be made for sanction to the necessary ions that will cover the cost. The general purposes committee of the Corporation of Durbania considering the purposes of a fire englier.

while the town council of Lancaster has plans for a similar piece of apparatus. The chief constable of Scarborough has been authorized by the town council to obtain information regarding motor fire engines.

WILL HANDLE WHITE SALES.

Capt. B. K. Bagnall-Wild, well known to the automobile trade in London and other English cities, has been secured to head the commercial vehicle department of the White Company's British branch. The White truck, made by the White Company at Cleveland, O., is gaining a strong foothold in Great Britain, orders having heen received recently, those placed by Gamage's and the London & North West Railway being the largest.

NEW NOVA SCOTIA COMPANY.

Organized for the purpose of taking over the Nova Scotia Carriage Company of Kentville, the Nova Scotia Carriage & Motor Car Company of Amberst, was recently capitatized for \$2,000,000. A portion of the stock is to expended in the erection and equipment of a modern plant to ambers?

BUDAPEST CAB REGULATIONS.

The authorities in Budapest have drawn up regulations regarding the construction and equipment of such electric cale as may be licensed for use in the capital. The whiches shall carry four passengers and their bacages throughout the city. The vehicles will be after the landaulet model, fitted with side windows, canony, space for lugsage on the top of the roof, brass mounted fittings at the back, a bood for the reserve wheel, two electric or kerosene head lamps, two reserve acetylene lamps, with reservoir, for extra-urban travel, and a gians windshelps.

NEW SOUTH WALES MARKET.

Those familiar with the situation claim that if trade in the heautiful markies that are quarried in New South Wales is to he developed, it will be necessary to utilize motor trucks for the conveyance of the heavy blocks to the seaboard for shipment or to the centres where the markie is dressed. The matter of transit seems to be the only impediment in the way of a rapid growth of the industry, and a number of companies are giving the subject of motor driven vehicles deep consideration. There is one thing that may stand in the way of the introduction of the heavy trucks and that is the roads or bush tracks.

BRIGHT OUTLOOK IN THE SOUTH.

H. C. Whitner, travelling sales representative of the American Locomotive Company, New York City and Providence, R. I., recently returned from a five months' trip through Georgia, Florida, Louisiana and other southern states, covering 25,060 miles while away. He reports a bright outlook for the motor track in the territory travelled during the year to come, and declares that the most progressive firms in the South are alert to the possibilities of the Industrial transport.

"The work that a five-ton motor truck in Baton Rouge has been doing to relieve the flood situation is known all through the South," says Mr. Whitney. "It has fairly amazed husiness houses, many of which did not realize before how great an influence motor trucks could exert. This single rehicle has accomplished much for the popularity of the motor vehicle in the South."

SIMPLICITY AND ACCESSIBILITY OF IDEAL TRUCKS.

S implicity and accessibility are important factors to be considered in the industrial transport, and these features receive serious attention by those whose business and capital does not warrant the outley of money involved in maintaining more than one machine. To be operated economically the vehicle should be no designed and constructed that in the event of accident the damaged part may be removed quickly and easily and a new member substituted without unnecessary delay and loss of service from the car.

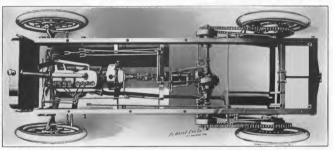
In designing its product, the ideal Auto Company, Fort Wayne, Ind., gave the subject of accessibility serious consideration and throughout the chassis has incorporated mechanical features making for simplicity and easy maintenance. Anyone of the three important units of the motor car, the power plant, transmission and Jackshaft, are seconstructed that one or more may be removed easily without disturbing the other components. This accessibility even includes the radiator which is hinged and spring suspended, a noteworthy feature. Even with the body fitted to the chassia, the components of the latter may be in-

measurement. The pistons and rings are also ground accurately to size and carefully fitted, insuring the same relative compression on each cylinder and a well balanced motor

A tirree boaring crankshaft is employed, this members being of a high grade, specially hested siece and ground to size. This revolves in bearings of ample size and as a considerable these bearings are carefully adjusted, it is claimed they will operate thousands of miles without any other attention than lubrication. The same high grade of materials and workmanship is noted in the construction of the con

Components of Power Plants.

The mechanically operated and interchangeable valves, both intake and exhaust, are located on the left hand side of the motor, which is noticeable for its compact design and amough lines. The valves are of liberal size and these are actuated by a single cambaid the cams of which are well designed, linuring quiet operation. A feature of the valve mechanism is that of enclosing the springs, guides and



Chassis of Model H Idesi, a Design Making for Simplicity and Accessibility of Components-Any of the Units May Be Removed Without Disturbing Other Parts.

spected and inhricated readily without undue effort on the part of the operator. The unit construction has also been applied to the seat, this member, including the gear shifting lever, steering mechanism, dash, ture | rank, etc., but detached easily from the chassis by the loosening of a few holts

Three Models Produced,

Three models are manufactured by the company, these being known as 1, H and G and their rarrying capacities are 1500, 2000 and 3000 pounds, respectively. In the matter of chassis construction the models I and H are similar with the exception that certain components of the larger vehicle are strengthened to meet the respirements of larger loads. The G model differs only in the clutch and motor, the latter being rated at 35 horsepower against 24 for the smaller cars.

Both models H and I, Illustrated herein, are fitted with a four-cylinder, four-cycle, water-cooled motor having a 3,5-inch bore and 4,5-inch stroke. The cylinders are offset, being cast in pairs with integral water jackets, and these are illeral in size providing ample cooling surface under all conditions of service. A special bigh trade, closetrained gray from is utilized and in the matter of machining and grinding special care in taken to insure accuracy of stems in a demountable housing, protecting the members from foreign elements as well as making for quietness. This housing may be removed easily by loosening a locking series.

Both the Intake and exhaust manifold are retained by stirrups mounted upon stude and the Intake member is of the T type, the mixture passing unobstructed through an opening in each cylinder to the combustion chamber. The exhaust manifold is liberal in size, insuring a free excress of the burnt cases and reducing back pressure to a milimit

Both the carburetor and magneto are located on the left hand side of the motor leaving the right of the engine remarkably free from obstructions. Ignilion is by a true high-tension magneto, although option of a double Ignition system and storage battery is listed as extr. The oiling system is a mil-tonstained, constant iter's force freed and suitash, the lubricant being circulated by a gent driven pump located on the left hand side of the motor. Provision also is made for two leads from the oil container to the camebalt bearings.

Novel Radiator Design,

Cooling is by the thermo-syphon system assisted by a belt driven fall. Cooled fluid is taken from the bottom

of the radiator and led to a manifold on the right of the motor and after circulating through the water jackets, flows ont through another manifold on the top of the cylinders mission are suspended by cross members, these being securely anchored to the main frame.

Final drive is by side chains to the rear wheels. The



Ideal One-Ton Vehicle, Depicting Location of Driver and Controlling Levers at Hight,

and thence to the radiator. A feature of the latter, which is equipped with vertical tubes, is its suspension. It is mounted on hinges which permit the cooler to be swung outward when desired. A balanced spring suspension absorbs all road shocks and vibration. As will be noted in an accompanying illustration, both the water manifolds and pipes attached to the cooler are equipped with flanges, these being held together when the radiator is in position by retaining boits. These flanges are carefully machined and the use of gaskets or shellac is dispensed with as the members are absolutely water tight when properly connected. The flanges may be separated quickly and the radiator swung out or the cooler removed when an inspection of the power is desired.

Construction of Clutch.

The clutch utilized is patented, and is of the expanding wedge type. It is pointed out by the maker that it is free from binding or biting and operating as it does in a constant bath of oil is very easy in its engagement yet is free

from slipping. The accessibility of this member is in keeping with the design of other components. By utilizing a substantial double universal joint at the rear of the clutch, the latter and its housing may be removed quickly, the operation involving but the loosening of four retaining bolts. The company maintains that as the clutch operates in oil it is not susceptible to wear, all parts revolving with the flywheel whether the clutch is in or not.

The transmission is immediately forward of the jackshaft and is secured to the housing of the latter by a webbed casing, insuring alignment and rigidity. The sliding gear transmission provides three speeds forward and reverse and all gears are of a high grade pickel steel having wide face The shafts and bearings are ample in size and operate in a bath of

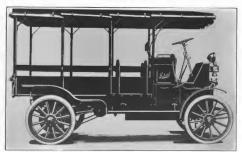
lubricant, insuring quiet operation. A straight line drive from the crankshaft is a feature of the design, insuring a minimum loss of power. The clutch housing and transrear sprockets are boited to the wheel drum proper, being conducive to accessibility. The frame is of angle steel with white ash sills, two by five inches, boited on, a construction making for flexibility when traversing rough roads. All cross members are of crucible cast and angle steel and the corners of the frame are well braced and bot riveted.

Both the front and rear axles are square, being drop forged. The front axle is 1.5 by two inches, while the rear is two inches square on the model I. Those on model H are 1.625 by 2.25 Inches front, and 2.125-inch rear. Ball bearings are employed in the wheel

hubs and steering knuckles. Particular attention has been paid to the construction of the yokes, these being drop forged and of liberal size. Those on the smaller model are seven inches deep, while the model H is equipped with members nine inches deep.

The springs are secured to the axles by substantial clips, three-quarter elliptic being employed in front and three-quarter platform in the rear. An auxiliary cross spring is utilized when carrying heavy loads. The wheels are of the artillery type and 12 spokes are employed on both models. Model I is equipped with 1.75-inch spokes in front and two-inch at rear. Model H utilizes two-inch spokes in front and 2.25 in rear.

Solid tires are fitted as standard equipment on models H and I, although pneumatics may be had, these being extra. On the smaller vehicle the front tires are single, 36 by 2.5 inches front, and 36 by three rear. Model H is equipped with single tires, both front and rear, the former being 36 by 2.5 inches and the rear 36 by four. The wheelbase is 109 inches for model I and 115 for H, the tread

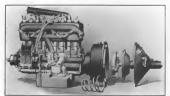


Model I, 1500 Pounds Capacity Ideal Truck, Equipped with Standard Type of Express Body.

being 56 and 58 inches, respectively. A short turning radius is a feature, it being claimed that either machine may be turned in 20 feet.

Ample Sized Brakes,

Unusual attention has been paid to the matter of brakes, an important factor in the operation of the industrial trans-



The Motor and Clutch of the Ideal Truck Are Compactly Arranged and Readily Accessible.

port. Two sets are provided, the service members belig to n hubs of the Jackshaft. These are of the internal expanding type operated by pedal and their friction action is balanced by no equalizer mounted just front of the transmission. These brakes are 10 inches in diameter with two-inch face. The emergency members are also of the internal expanding type operating in the drums of the rear wheels and actuated by a hand lever convenient to the driver. These are 10 inches in diameter and have a two-inch face. The total braking surface provided by these two sets is 270 square inches. Well designed radius rods make alignment of the rear state an easy matter.

The steering goar is of the goar and sector type being connected to the road wheels by a horizontal reach rod. The adjustable tie rod is located behind the front axie protecting it from possible damage by road obstructions. The spark and throttle levers are mounted upon the steering column and the latter is fitted with a 16-linch wheel. The gear of the steering mechanism is secured to the front cross member of the frame. The worm attached to the end of the column is in mesh with the gear when the seat unit is in place, but these components are easily separated when the unit is removed.

Removable Seat Unit.

The seat unit and motor bousing may be taken from the thassis by loosening two holts. It is constructed of scontructed of and the side panels for inspection purposes are also of this metal. Additional means for inspection are provided by floorhoards while a removable member in floor of hody permits access to the transmission.

in the matter of construction, the company has considered the comfort of the driver, a removable spring scat being fitted with a leather covered "lazy back." The uplosisering is deep and a high grade of isether is employed throughout. The standard equipment includes three oil lampa, horn, tool kit, tool box, fenders and running boards. The weight of the chassis, which includes sent, is 2800 pounds for model I, and 3256 with express hody. The model H chassis, weighs 3000 pounds, and 600 extra with standard hody.

Although the company manufactures a large variety of bodies to suit the Individual requirements of the customer its standard bodies are interchangeable and are eight feet by 44 inches, and eight feet six by 58 inches for model 1. The bodies of the 2000-pound vehicles are made standard in the following sixes: Eight feet six inches by 44 inches Inside, and nine feet by 58 linches. The standard color is cobalt blue for hody and chassis, although this is outloomal.

Details of Model G,

The model G differs from the smaller vehicles tnasmuch as the motor is cast en bloc and is rated at 35 horsepower, although it is stated it will develop 42 at 1500 revolutions a minute. Cooling is by a centrifugal pump and a double ignition system, consisting of magneto and hattery with coll, is utilized. The clutch is cone in place of the wedge type utilized on the smaller models. Demountable solid tires are employed both in front and rear, the front members heling 36 by four inches, and the rear 36 by five. The wheelbase is 124 inches, and tread 50.

The other components of the chassis are identical with those of the smaller models with the exception that parts are strengthened as necessary to take care of heavier loads. The chassis weights 3800 pounds, and with platform body 4500. The inside dimensions of the standard size bodies are 10 feet, 58 inches and 11 feet, 54 inches.

Throughout the construction of the Ideal vehicles careful attention has been paid to small details which, with the simplicity and accessibility of design, make for a sturdy truck for heavy duty service. Although the rated capacities are given, the Ideal Auto Wagon Company states its load rating is conservative.

NEW KNOX PATROL.

The motor police pairol, built by the Knox Automobile Company of Springfield, Mass, soon to be placed in commission in Manchester, N. H., will be the largest and most completely equipped in all tight details of any in the country, according to the specifications of the manufacturer. The new machine, which will be of 76 horsepower, will be delivered in about 60 days. It will be utilized as a combined patrol and ambulance. Two double artechers will be carried and in addition the seats are arranged with a rail that can be lifted, preventing a person rolling from the cushions, making, in fact, a stretcher of each of these. The machine will be lighted throughout by electricity, the Berdon system



Front View of Ideal Truck, Showing Hinged Raddator and Removable Sent Unit.

heing used. The current will be furnished by a dynamo run by the engine, and in addition to the front and rear lights, there will be two dome lights inside.

MOTOR TRUCK CLUB MEETING.

Plans for expansion were considered at the last meeting of the New York Motor Truck Club, which has grown from a somewhat vague organization to one of decided usefulness in the commercial vehicle field. Aiming, originally, at promoting a few shows for trucks, the organization has found for itself a place in the industry as a nucleus for all kinds of industrial transport interest and as a medium for the exchange of opinion among makers, huyers and seilers, for the common information of all. To provide for greater usefulness, it was voted to enlarge the membership so as to include three classes-active, comprising those actively engaged in the industry; associate, comprising owners and some classes of operators, garagement, etc., and honorary, including the press and such others as the club may from time to time add to the list. The privilege of ail information and of the floor at all meetings will be open to all classes, but the voting power rests with the active members only.

A sharp attack was made on demonstrating, or the evits of it. It was calismed that the custom of free demonstration had been abused, not only in New York City, but sill over the country. It was pointed out that rival manufactures have been aystematically "used" by hig merchants, with vague, if any prospect of huying, and to such an extent in New York City, that many of the latter have been pinced on the "black list..." Charles E. Stone, secretary of the club, gave a paper on this phase of the situation, in which he stated:

"Demonstration according to the dictionary is a showing or pointing out; an indication, manifestation or exhibition. According to the truck salesman, it is something necessary to do in order to make up for his own lack of ability or experience. According to the prospective purchaser it appears to be an easy method of securing free delivery of merchandies without incurring any expense or trouble. According to the expert accountant it is one of the greatest sources of loss connected with the sales of trucks."

Mr. Stone pointed out that the truck salesman must necessarily employ different means than the man handling the pleasure car, a fart he believed had not been fully realized to date. Furthermore, he maintained that a man who had been a success as a pleasure car salesman, might be a complete failure in handling the sales of trucks. In closing his moner, he said:

"We are Inconsistent in another very vital particular, zamely, the personal appearance of our aslessmen. Our buman sales force goes forth well dressed, but the ailent aslessman, the truck, often barely has enough paint ieft on the over half the metal, with a body much the worse for wear, and perhaps festoned with ceils of old rope and our of the intended purchaser, is it any wonder that he is loath to go anywhere near the thing." If it is thought desirable for an elsemen to dress well, why not our demonstrating trucks, in keeping with the standing and reputation of the companies behind them:"

NEW LIPPARD-STEWART COMBINE.

T. R. Lippard and R. G. Stewart, organizers of the Lippard-Stewart Motor Car Company, Buffalo, N. Y., have resized from that organization and have formed the Stewart Motor Corporation, with headquarters in Buffalo. Mr. Lippard is president and cheff engineer of the new concern. R. P. Leatz is secretary and treasurer, and Robert W. Ingersoil, formerly with the Lippard-Stewart company, is sales manager. The capitalization of the new company is \$250,000. and temporary offices have been established at 1056 Eilicott Square huilding.

It is stated that the founders of the Lippard-Stewart company withdrew because of business differences with other members of the firm. The older company will continue to operate the factory in Elmwood areaue, Buffalo, August Becker, who has been president of the company since Aug. 15, 1911, and Mr. Barcalo, who has been secretary and treasurer since the same date, are now in full control of the company. Charles H. Dabiquist, who was factory engineer, has been made chief engineer in place of Mr. Stewart, W. F. Reynolds is the sales and advertising manager.

The older company will continue to manufacture light delivery cars of 1500 pounds capacity, and will also, in the very near future, manufacture and sell a one-ton delivery truck. The new corporation will produce light trucks of 1500 pounds capacity, constructed along the lines of the one made by the firm with which its members were previously connected.

MORGAN REPLACES TROLLEYS.

A five-lon Morgan truck, made by the Morgan Motor Truck Company, Worcester, Mans., was recently sent to Portamouth, N. H., where it will be used in place of a trolley line between that city, Kittery, Me., and other points of interest in the vicinity. The automobile has seats placed sideways, and can accommodate about 30 passengers. It was built with a special body, similar to that of a troiley car, with top and side posts. The entrance is by a running board in the rear, on which the conductor is to stand to take fares as the passengers enter. In case the machine is found satisfactory, others of similar construction will be bought.

MOTOR CARS FOR TRACK WALKERS.

The Boston & Alhany division of the New York Central Railrond, is contemplating, it is said, purchasing to motor cars for railrond tracks, to take the place of track walkers, and handcars for sectional gangs, which the officials have considered dangerous for up-to-date railor Taffe. The cars are to be similar to those properlied by hand, save they will have four fanged wheels, and will be equipped with a two or three-yillider type of motor. The plan is for about 2b horsepower, with two forward speeds and reverse transmission.

EXPRESS COMPANY HAS WESTFIELD

The Seymour Motor Express Company was recently Incorporated in Connecticut. The firm has purchased a twoton Westfield track, made by the Westfield Motor Truck Company, Westfield, Mass., and will conduct a delivery business between Seymour and New Haven by the way of Woodbridge. Dudley H. Riggs, formerly of the Auto Express Company, will be the manager. The truck will later be equipped with seals so that it can be used in passenger carrying service also.

RAILROAD SECURES MOTORS.

The Pennsylvania raifroad will displace its heavy horses and drays at its shops in Harrisburg, Penn., with motor trucks. A large number of teams has been utilized to do the carling about the shops in the past, but these will be entirely replaced. A garage for the storage of the automobiles will be built on the company's property at Seventh and Reily streets.

TRANSCONTINENTAL DELIVERY BY ALCO.

THE first transcontinental delivery of merchandise ever attempted in the commercial vehicle industry began in Philadelphia, June 20, when Charles W. Young & Co., of that city consigned a three-ton load to an Alco truck, made by the American Locomotive Company, New York City and Providence, R. I., for delivery to the Carson Currier Company in Petaluma, Cal. The estimated distance to be covered in this experiment is 4436 miles. The ultimate success or failure will be awaited with interest,

It may be held that as a commercial proposition the delivery of goods across the continent by motor transport will never be practical. However, that is a point which may be open to question. A few years ago it would have been considered that cross country motor haulage could not be made economically and efficiently. Conditions bave changed materially. The present transcontinental delivery may prove the forerunner of a new era.

At least, it will demonstrate the utility of the particular vehicle selected for the test. In addition, there is much to be learned concerning the equipment of the car, and par-

third truck of the same make will be placed in commission soon. Mr. Baker points to these orders as strong evidence of the satisfactory operation of G. V. electric machines

GROCER BUYS MARTIN TRUCK.

The Bayer-Beaver Company, wholesale grocer in Huntingdon, Penn,, recently added a Martin three-ton 45 horsepower, four-cylinder truck, made by the Martin Carriage Works, York, Penn., to its delivery equipment. The machine attracted unusual attention as it is the largest of ita kind in the vicinity. The grocery concern plans eventually to entirely do away with its borse drawn vebicles.

PIERCE-ARROW DELIVERS LUMBER.

The time of loading and unloading a Pierce-Arrow fiveton truck, made by the Pierce-Arrow Motor Car Company, Buffalo, N. Y., has been reduced to a minimum by the Capi-

tol City Lumber Company of Front street, Hartford, Conn. The time required for both operations is five minutes or less, five to six tons of lumber being handled to a load. This means over 5000 feet of lumber, double and nearly triple the amount that could be hauled by a pair of work horses.

The truck was designed by the Miner Garage Company of Hartford, the regular Pierce-Arrow chassis being employed, but au extra long wheelbase has been provided. The body is equipped with a series of rollers which permit the whole load to be dumped in one minute. To load takes a trifle over three minutes. At the yard, the jumber to be delivered by the truck is assembled on a large wagon, termed a "feeding wagon." er" to the larger vehicles.







Three-Ton Alco Leaving Philadelphia on the Pirat Transcontinental Delivery Trip.

ticularly in the matter of tires. This Alco is shod with new United States demountable solid tires, made by the United States Tire Company, New York City, and the outcome of the trip will be watched with quite as much interest by those intent upon studying the tire problem.

The start from Philadelphia was decidedly in keeping with the magnitude of the undertaking. Assembled at the Point Breeze race track, several local husiness men took part in the programme. Letters of greeting from Gov. John K. Tener of Pennsylvania to Gov. Hiram W. Johnson of California, were a part of the cargo. E. I., Ferguson, an official in all the Glidden tours and in many transcontinental trips, is in charge of the expedition,

THIRD ORDER FOR G. V. TRUCK.

The Brown & Sharpe Manufacturing Company, Boston, Mass., recently placed its second repeat order for an electric motor truck with Day Baker, New England manager for the General Vehicle Company, Long Island City, N. Y. The purchaser bought its first machine somewhat over a year ago, soon following it with an order for another. The

AUTOCAR REPLACES EIGHT HORSES.

Albert Hansell, one of the best known fruit growers and produce raisers in Burlington county, New Jersey, recently purchased a motor truck, made by the Autocar Company, Ardmore, Penn., and it has proved such a saving over his horse drawn wagons that he says he does not know how he ever did business without it. The truck is used in delivering fruit in Philadelphia. Mr. Hansell says bis Autocar does the work of eight horses. It takes a team of good horses 10 hours to haul a load of produce to Philadelphia and return to the Hansell farm, a total distance of 34 miles. The Autocar accomplishes this same journey in 3:15:00. in other words, the car can deliver four loads to a Dock street commission merchant while a team of horses is delivering one.



BRIEF NEWS OF MANUFACTURER AND THE TRADE

The Braceder Robber & Tire Company, Wallington, N. J., has incorporated with \$250,000 capital stock, to manufacture rubber tires and specialities.

The Mogul Motor Truck Company, Plano, Ill., has increased its capital stock from \$125,000 to \$500,000 so that it may enlarge its manufacturing equipment.

The C. R. Wilson Body Company, Detroit, has glosed blds for a \$45,000 factory building. The new plant will be three stories in height, 171 by 101 feet, and will be of brick and steel construction.

The Endie Vehicle & Genr Company was organized recently in Buffalo, N. Y., to manufacture motor trucks. The company has a capitalization of \$200,000, and it plans in build a factory

The Proctureless Tice Company was recently incorporated in Louisville, Ky., for \$5000, divided into shares of \$100 each. The incorporators are Andrew T. Murphy, John H. ("Nell and H. John Hobson.

The Enterprise Motor Truck Company was incorporated recently in Baltimore, Md., for the purpose of manufacturing commercial vehicles. The members of the concein are Gustavell, Nachman, J. Horry West and J. Walbach Edelen.

and garage is to be erected, and the branch will be conducted by Henry Bonde, under the title of the Bonde Auto Company. Mr. Bonde was formerly employed in the Warren plant.

Cheatham Bros, Atlanto, Ga., is to take the agency for the Veile pleasure and commercial cars, made by the Velle Motor Vehicle Company, Moline, III. A gorage of brick, to cost approximately \$500, is being erected at 65 Peach street.

The Standard Engineering Company was formed recently in Belfast, Me., by Austin W. Keating and Maurice W. Lord. The company, which is capitalized for \$10,000, will do a general sales business in automobiles, accessories and equipment,

The Delphie Specialty Manufacturing Company, Detroit, has been incorporated with \$20,000 capital stock to manufacture automobile parts and accessories and to do general machine work. Peter J Wexployaki is the principal stockholder

The Cilineon' Motor Car Company of Cincinnati, O., recently leaned three rooms in the new Seely building in that city. The company is agent for the Packard pleasure and commercial vehicles, made by the Packard Motor Car Company, Detroit.

4 White Agency was recently opened in Nashville, Tenn., by Elbert S. Craig and L. E. Gibson. They will handle both



Port of the Fleet of 46 Alco Trucks in Service with the American Express Company, New York City,

The Drake Holiway Acts Trock Company is one of the newest curporations in New York City. It has a capitalization of \$150,000, and the incorporators are F. E. Drake, A. Houer and II. B. Tibbetts.

The Julia Weier Truck Company, Detroit, has been incorporated with \$10,000 capital stock to manufacture automobile trucks. The incorporators are Leroy 8, Julia, George Hornberger and Nidney I, Harry.

The Van Gnord Mooufacturing Composy, maker of windshields for automobiles, with headquarters in Detroit, is preparing plans for two large additions in its plant, one 90 by 200 feet and the other 60 by 100 feet.

The Non-Destructible Tire Company has been incorporated in Brooklyn, N.Y., with a capital stock of \$25,000. The incorporators are Martin Pelz, William Weiner, Herman Seufert, William Texfer and Blehord Weber.

The Willord Storage Batteey Company is having an addition built to its plant in Cleveland, O., which, when completed, will give a total of 25,000 feet of floor space. New offices were taken recently at \$716 Euclid avenue, Cleveland.

The Warren Motor Uar Company, Detroit, Mich. maker of the Warren-bejroit pleasure cors and light delivery wagons, has established a state branch in Fargo, N. D. A salesroom

the pleasure and commercial vehicles made by the White Company in Cleveland, O., and will also conduct a general garage.

The Eastern Motor & Conveyance Compony is planning for the erection of a public garage at Fayette street and Philadelphia avenue, East Baltimore, Md. Plans call for a one-story building of brick and reinforced concrete, 50 by 122 feet.

The Commercial Service Track Company, Grand Rapids, Mick., has been organized, with a capital of \$155.000, by Philip Moran, J. W. Laudman, G. Il Greenbouer and others. The new company is a reorganization of the Van-L Truck Company.

The American Express Company, New York City, now operates a flect of 6 Aice trucks, made by the American Locomotive Company, New York and Providence, it. 1, a portion of which is shown in an accompanying Hustration. The 10th order has only recently been placed, specifying five 3-5-ton vehicles.

The National Body Comfort Company has been formed in Windsor, Ont., with a capital of \$100,000. The company will manufacture bodies for both pleasure and commercial motor vehicles. A \$35,000 building is in the course of erection.

Frank Hardari is having a large gapose built at 2126-28 Markot street, Philadelphia. The structure will be two stories in height, of brick, and will cost approximately \$10,000, Mr. Hardari will conduct a salestroom and a service station.

John A, Graham, at one time superintendent of assembling and testing at the Brightwood Motor & Manufacturing Company, Springfield, Mass, has been appointed engineer and superintendent of the Westfield Motor Truck Company, Westfield,

The Heary Engineering Company was incurporated in New York City recently for \$20,000, to design and manufacture parts for molors, automobiles, etc. The numbers of the concern are: George L. Henry, thenry W. Badenhausen and Myron F. Lilli.

The Randolph Motor Truck (ompan, has been incorporated under the laws of belaware with a capital stock of \$100,090. The contern, in which considerable Chicago capital is interested, is to manufacture motor trucks in some belaware city not yet

The North Jersey Auto Sapply Lampany has been formed in Jersey City, N. J., to do a general automobile husiness. The capital stock is \$18,000, Jersey City and Newark med being interested in the concern. The directors are E. C. Mohrof. C. U, Butler, F. W. Mead.

The Passins Manufacturing Company has been formed in Malvern, Ark. for the purpose of making motor trucks. S. F. Sherman of Chattanonga, Tenn. is the president of the new concern, and it is said considerable Tennessee capital is interested in the project.

The Dennia Molor Company, with headquarters in Toledo, O., has been formed for the purpose of dealing in automobiles, motor parts and automobile accessories. C. H. bennis, C. W. Clow. Allen E. Reid, R. S. Woodrow and John H. Melster are the atockholders. The concern has a capitalization of \$25,000.

The Lawrence Auto Company, New Castle, Penn., was recently purchased outright by the John Electric Company of the same city, Lee Coller, who was with the Lawrence people. vices. Building additions are also being made to the storage battery department. The total number of buildings in the course of crection will double the floor space of the plant.

Hussett & Rogers, Iac., was formed in Amesbury, Mass., a surrounding such a capital stock of \$18,000 to manufacture automabile bodies for commercial and pleasure vehicles. The members of the concern are James H. Hossett, Charles H. Prescutt and theories E. Collins all of Amesbury.

The Pitt Motor Track Company has been formed in Pittsburg, Penn, to manufacture motor trucks and a line of pleasure vehicles. The officers of the concern are J. E. Pusuglass, W. P. Ibouglass, W. S. Wilson, F. O. Brandt and J. E. McCalmont, all of Pittsburg. The capitalization is \$200,000.

The Apple Electric Company has been incorporated for \$300,-00 in Dayton, O., and will manufacture and deal in electrical ignition and starting systems for motor cars and all kinds of gasoline engines. The incorporators are: V. G. Apple, Oscar Apple, J. C., Slager, Clarence Kelfer and Carl Bauman,

The Ariston Company, with a capitalization of \$1000, was recently formed in Boston, Mass. The directors and officers are: Treasurer, C. 13, Knapp; A. Leslie Harwood, Jr., and Thumas D. Luce, Jr. The company was formed to sell automobiles of hoth pleasure and commercial types on commission.

The New York Labeleating Oil Unmpany, sole proprietor and referred Monogram oils and greases, has taken new quarters for its Tacific Coast branch ut 516 Second street, San Francisco, Coast. The new location is a four-story building fitted with the most modern appliances for the sterage and handling of lubrishing.

The Automatic Starter l'ompany was incurporated recently in St. Lauls, Mo., with a capital stock of \$50,000. The concern will manufacture a self-starter, invented by John J. Cochran, and it is planned to build a factory in St. Louis,

Dagacene Motar Car Company Is to beformed in Pittsburg, Penn., application having been made for a charter of incorporation by W. I., Rodgers, F. W., Newton and R. F. Hamsey, The new concern is to be formed for the purpose of manufacturing pleasure and commercial motar vehicles and accessives.

The East End Anta Company recently made extensive improvements in its premises at 15th and Walnut streets, Harrisburg, Penn, Its karage was celurged and a modern repair stop and elevator installed. The company took the agency for the Atterbury truck, made by the Atterbury Motor Car Company, Huffalo. N. Y., a short time ago.

The Taylor Malor (far Company occupies a three-soury building at \$12-31 Kelly arrect Pittsburg, Penn, where it conducts saleswoms, a repair along, stock room and a paint along. The company is having exceptionally good success with the Lippard-Stewart Motor Car Company, Buffolo, N. Y.



Picet of 11 International Anto-Wagons Recently Purchased by Large Concern in Cincianatt. O.

has gone to Youngstown, O., where he plans to conduct a general automobile garage.

The Detroiter-Haltimore l'ampany, Baltimore, Md., has been formed for the purpose of manufacturing automobiles and motor trucks. The officers of the concern are, B. H. Croxton, A. Jarman, J. Oscar Stermer, Clara L. Croxton and Howard F. South, all of Baltimore.

The Hexpleae Lubriesting Company, Inc., was organized reterily in New York City for the purpose of manufacturing lubricants for automobiles and other machinery. The capitul is \$4550 and the Incorporators are: Fred Lesser, Norman Ehrenthal and Herman Block.

The Beckwith Trucking Lampans was formed in Penn Yan, N. Y., recently for the purpose of doing a sceneral business in automotible; und automotible supplies. The capitalization of the concern is \$10,008, and the incorporators are II, Allen Wagener, Jay Beckwith and Urace K. Beckwith.

A. Helegreet & Yo., hankers, New York City, have had a une-story centered in their factory erected in Poughkeenler, N. N., near the works of the Flat Metter Car Company, where electric lighting notifies for automobiles will be manufactured. The new concern will be known as the A. B. Manufacturing Cennium?

The Gaide Motor Lamp Manufacturing Company, Cleveland, O., has incorporated with a capitalization of \$100,000. The incorporators are H. J. Monson, W. P. Pearsons, W. H. Bunce, J. D. Kauffmann and W. L. Rose, The company will manufacture impies and other equipment for automobiles.

The United States Light & Heating Company, Niagara Palis, N. Y., is erecting an addition to its present factory buildings 55 by 320 feet, three stories in height of relaforced concrete, to give room for the manufacture of automobile starting de-

talline A Desemblite, formely of Brewsiers, New York City, one of the largest cosh factories in the Philed States, after looking the situation on the Pacific Yosat over thoroughly, has decided to locate in Bakersield; Yali, and will open a ment will include a dust proof finishing room, and apparatus for enamelling, brass burnishing and polishing and

H. K. Anda, until recently ensured in commercial enginering work with the engineering department of the National Electric Lamp Association, Cleveland, O., has restgred to assume management of the Elux militature lamp works of the General Electric Company, New York City, W., Annin is well controlled the Company of the Co

The Goodyner Tire & Hubber I vompany, Akron, O., In comtemplating the erection of a large fireprox building near the junction of Commonwealth avenue. Beacon street and Brookline avenue, Boston, Mans, to be used as a receiving and ditributing warehouse. In addition to its present building in common distribution of the common distribution distribution distribution distribution distribution distribution distribution dis

The International Marvater Company, Chicago, has been seeling international Auto-Magons in flests during the past weeks. An uccompanying illustration presents 11 of these machines sold to a large concern in Chicannat, and another public service company in that city also has replaced its horse with 11 internationals. A Chicago house operates 11 under

PHILADELPHIA'S SECOND ANNUAL PARADE.

FIVE divisions were necessary to accommodate the commercial vehicles which took part in the Philadelphia inquirer's second annual motor truck juracie in Philadelphia, June 29. Five hundred and nine cars occupied more than an bour in passing a given point. In many respects it was the most successful demonstration of this character that has been held either in his country or abroad

The first division was limited to cars of over 70m pounds capacity, and was headed by a larke Waverley ele-trie, carrying the committee and Chief Marshal Archie Hughes. The marshal of the division was H. P. Childs of the International Mojor Company, ansisted by W. C. Middle-ton of the Foss-Hughes Company and Joseph Smith. Conspicuous among the entries was the Fraukilin Sagar Refinery Company's 13,000-pound Mark Irrik carrying 15,000 pounds of sugar; John Rapu, Inc., & Co.'s Intent-point Saurrer; two G. M. C. 10,000-pound wagons; five Pierce-Arrows of the same capacity; two Kisselfars of None pounds capacity each, and Charles W. Young & Co.'s trans-continental Alc

L. J. Eastman of the Eastman Sales Company was marshal of the second division, with W. Eldridge of the Eldridge Woods, Detroit, Waverley, Studebaker, Baker, Walker and Columbus.

The entry list included the product of the following

makers:
Autocar Company, Ardmore, Penne, Autocar 72, Deckard
Motor Cor Company, Defroit, Packard, 47, International Motor
Port Company, Defroit, Packard, 47, International Motor
pany of American, Publishedpide, Commercial, 23, White Company,
Provident, B. & J. 21, Gram Motor Track Company,
Dertit, B. & J. 21, Gram Motor Track Company,
Dertit, B. & J. 21, Gram Motor Track Company,
Company, Elyria, O., Latford, B., Mercian Lecumette Comjany, Providence, B. J. & Mee, B. B. & Wilcox Motor Crit Comjany, Providence, B. J. & Mee, B. B. & Wilcox Motor Crit Comjany, Pork Denn, Hart-Kraff, B., Carlevar Company, Postine,
Meh. Parterers, nities: Kelly Motor Track Company, Postine,
Meh. Parterers, nities: Kelly Motor Track Company, Logist,
Delyron, W. C., Charles, Seving, B. & Wilcox, B. & Wilc



Representative Showing Made by Jadastrial Transports in Philadelphia's Annual Parade as They Appeared on Market Street,

Company, and W. O. Rainsford of the Packard Motor Car Company, as has assistants. In this division were trucks of trom 100 n to 8900 pounds capacity. Six Alvos led the precession, followed by five Durable Daytons. Among the other makes represented were: Baker electric, Chane, Carford, G. W. C., Kisselkiar, Gradowsky, Gramm, Kelly, Mack, Morgan, Seltz, Philadelphia, Studebaker electric, Thomas, Packard, Honce, Wileys and White.

The third division was confined to cera of 2100-3000 grounds. W. White of the General Vehicle, Company was marshal, assisted by N. W. Bushy of the N. W. Bushy Company and David O. Eduton of the Authert Company, Anoma the makes represented were the following. Authern, Devator Hoosler Limited, Garford, Mark, Sandwisk, Similey steam, Wilcox, Harr-Krafa, G. M. C. and Mark

The fourth division was composed of light delivery colicles of less than 2000 pounds, including the following makes. Atterbury, Padillae, Carterear, Croxino, Dennistion, Detroit electric, Furl, Planders, Gramm, Hatfield, Life Blant, Martin, Service, Studebaker electric, Wilcox and White.

The last division was limited to electrical vehicles, and was in charge of E. M. Hare of the Commercial Truck Company of America as marshal. The following makes were among those represented: G. V., G. M. C., Philadelphia.

Truck Ossipany, Grand Rapids, Mich., Docytar Gooder Limited, three, Calillar Motor Car Pomisian, betroit, Public, three, Calillar Motor Car Pomisian, betroit, Public, three, Cortiand Motor Wagner Company, 1911-664, Mass, Cortiand Gooder Wagner Company, 1911-664, Mass, Cortiand Gooder, Wagner Company, 1911-664, Mass, Cortiand Gooder, Mark Motor Terick, Christophard, Goldangoder, Ind. Mass, Cortiand Free, Waveley Company, Ordangoder, Ind. Wasserley, Cherry, Here, Creakion Motor Company, Caston Martin, Parick Company, Caston Martin, Parick Company, Caston Martin, Parick, Christophard, Carlon, N. V., Harbold, von Motor Company, Caston Company, Caston Company, Caston Company, Caston Company, Caston Company, Caston Carlon, N. V., Harbold, von Martin, Parick, Carlon, Carlon, C. C., Carlon, C. Carlon, C. C., Carlon, C. Carlon, C. C., Carlon, C. C., Carlon, C. Carlon, C

TABLE OF CONTENTS.

TABLE OF	CONTENTS.
· Page	Page
*Truck Efficiency in Long, Heavy Hauls	Second Annual Vehicle Parade
1 1 2 2 2 2 2 2 2 2	Boston Electric Vehicle Club
Boston Truck Show Dates	Hoston Electric Vehicle Club. 42 *Recent Motor Vehicle Patents 53 *Koehler Car Presents Many Novel Features 54
Shanks Agent for Kelly	*Kochler Car Presents Many Novel Features
Ament for Logamentic Touch	New York Testing Trucks
	Locomobiles Operate Economically
G. M. C. Delivers Asphalt	G. M. C. Saves Half Over Horses
*The Federal One-Ton Truck 435	*Fire Department Notes-
G. M. C. Delivers Asphalt. 434 *The Federal One-Ton Truck 435 Passenger Serylee in Texas 439	in . The second
Machines for Water Department 429 Milk Delivery with Pierce-Arrow 439 Autocars for Ashen Calleston 439	Christic Tractor in New York.
Autocars for Ashes Collection	Knox Chemical for Nantucket
restocate to Manea Confection	Danbury Witnessing Tests
*News of the Commercial Vehicle Industry-	Ahrens-Fox for Detroit
National Show Ulreuit	American La France for Leadville 480
New Packard Model	Pone-liartfords in California
Merger in Los Angeles	Pierce-Arrow for Chief
Accepted Accepted	Teta water Edulpment
Lange Motor Company Formed	Ladder Truck for New York480
International Plowing Contest	To Protect Outlying Districts 480
	Montreal Replacing Horses
	Adder Truck for New York 480 Web the December 10 10 10 10 10 10 10 1
	Truck for St. Johnsbury
With Buffalo Electric Company 441 New Truck from Springfield 441 Appelor Truck from Springfield 441	In the Market480
Another Truck from Detroit	*Knclosed Delivery Wagon Bodies
Another Truck from Detroit. 42 Krebs Organization Completed. 442 New Plant for Kearns Company 442 Levier Tendes New Wilsten	Cartercars for Milwaukee
New Plant for Kearns Company 442	*Foreign Truck Notes of Interest-
	Special Lacre Bodies
Penn Unit Company Organized	Interesting Garbage Wagon
*Building Special Motor Truck Bodies	Vans for Milk Collection
Kelly Company Entertains446	Sampson in Manituba
Nelly Company Entertains	Special Lager Bodies Section S
Baker Speaks in Montreal	Motor Service in Venezuela
	Malay Freight Transportation
KisseiKar Makes Record	Opening in Canada
	Germany Presents Opening
Ball Joints from Florida 447 Cost of Utilizing Gasoline Trucks, Louis ituprecht 448	
Buys Pope-Hartford Patrol	Will Handle White Sales. 487 New Nova Scotla Company. 487 Hudapest Cab Regulations. 487
	New Nova Scotla Company
Predicts Good Season 449 *Uniting Rubber and Steel 449	Rudapest Cab Regulations,
*Uniting Rubber and Steel	New South Wales Market
*Accessibility a Silent Crescent Feature 459 Georgia Leads the South 452	Bright Outlook in the South487
More Motors for Newcastle	*Simplicity and Accessibility of Ideal Trucks
More Motors for Newcastle. 452 White Trucks in Gloucester. 453	New Knox Patrol490
*New Knox Coal Dumper	"Indicates article is illustrated.
New Knox Coal Dumper	Therefore is interest,
Peerless in Coal Delivery	INDEX TO ADVERTISERS
Peerless in Coal Delivery	INDEA TO ADVERTISERS
	Accessory and Garage Journal
10	Available Truck Company
Spark Plug and Valve Gauge 451	Automobile Journal
Cutting Threads on Small Screws	Bessemer Motor Truck Company 4 Borne, Scrymser Company 8
Home Made Compressor455	Borne, Scrymser Company 8
Cone Centre Dividers. 455	Couple-Gear Freight-Wheel Company 6
Marking Steels for Steek Boom	Eagle Oil & Supply Company 6
Tiread Cutting Kink 455 Marking Steels for Stock Itoom 155 Curils Air Compressor 456 Separation Learning	Federal Motor Truck Company 3
Sebastian Lathe 456 Bending Light Tubing 456	Firestone Tire & Rubber Company
Bending Light Tubing	General Motors Truck Company
	General Vehicle Company
Cleaning Steel Rules	Goodyear Tire & Rubber Company
Prawing Temper from Brass 457 Lubricant for Oil Stones 457	Grand Rapids Motor Truck Company
*Correspondence-	Havoline Oil Company
	Jarvis-Huntington Automobile CompanyCover
Install a Governor	Knox Automobile Company 4
Standard Motor Truck Warranly458	Lynch Manufacturing Company 5
1	Mals Motor Truck Company 5
Taxicab Business Sold. 458 Coiver with Locomobile People. 458	Marburg Bros., Inc
*New Commercial Car Accessories	Mea Magneto
*New Commercial Car Accessories	Mea Magneto 8 Motor Truck Body Company 7 Moix Tire & Rubber Company 5
	Mots Tire & Rubber, Company 5
Influence of Motor Truck	Perfection Spring Company 8
The Farmer's Problems	Republic Rubber Company 4
*Ruppert's Brewery Electric Delivery, William W.	Royal Equipment Company 6 Splitdorf Electrical Company 7
Scott Brewery Kircipic Delivery, William W.	Splitdorf Electrical Company
Scott	Sullivan Motor Car Company 7
*Detroit Wagon in Army Service	Trade Information Exchange 8
Free Monthly Inspection	United States Tire Company 6
*M & P. Finetrie Helivery Wassen	Viotor Motor Truck Company 6
Conserve Conserve	Western Motor Company 5
Philadelphia Storage Batteries	White Company, The
	white Company, Inc

VOL. III.

PAWTUCKET, R. I., AUGUST, 1912

No. 8

MOVING WITH THREE-TON PEERLESS.

Experience of M. Sweeney Company Indicates Truck Will Do the Work of Four Two-Horse Teams in Hauling Household Goods with Economy in Men and Time.

By C. A. French.

CONOMIC transportation is a relative term. It is by no means difficult to indicate to the interested business man, who is open to conviction, that it is possible to utilize a motor truck at a substantial saving over horse drawn equipment. Ample illustrations are available, in which it has been demonstrated that a given vehicle could do the work of a stipulated number of horses and at a cost which represents decided economy. However, the problem eventually resolves itself into a proposition as to what

can be done by the individual investigator.

It will be conceded that the experience of one concern may not be duplicated by another in a distant city. or even in the same community. Tabu la ted statements of comparative costs are of undoubted value in a careful study of the hanlage prob-

Peerless Truck No. 2 in Service with M. Sweeney Company, Pall River, Mass., Hanling Homehold Purniture on Long Milenge.

lem, and no thoughtful business man will consider the plan of replacing his horse equipment without first obtaining sufficient data of this nature to furnish a basis for computation, at least. But after reaching this point, he must take up the matter of efficiency, for it is a well established fact that the utmost economy is gained only with the maximum efficiency.

With certain lines of business it becomes necessary to consider installations in addition to the purchase of the trucks themselves before it is possible to obtain the results desired. This applies more particularly to the handling of coal, for instance, although it undoubtedly is true, to a certain extent, that before the most satisfactory solution can be reached in practically every ease, some thought must be given to this matter.

It must be assumed that the business man is intent upon securing all of the business that he can care for

properly. The man who is satisfied with antiquated methods may not need a large investment of capital, but unq u e stionable the net profits will not indicate the entire possibiltties Moreover, there is always present the danger that the business is receding rather than progressing. This

may be applied generally as well as specifically.

If, for instance, a retail merchant relies upon the fact that his townspeople are aware he is in business, and makes no further effort to draw attention to himself or his wares, he soon finds himself a victim of that competition which has demanded that the most successful store advertise consistently, dress its windows attractively and adopt all other legitimate methods of keeping its name before the public, Undoubtedly, this added activity means the expenditure of considerable sums, but the increased business secured and the

COMPARATIVE MOVING COSTS.

Piffs Wiles by Hallroad

Haulage to freight depot			\$10.0
Removing piano to depot			5,4
Freight charge & 17c a cwt.			. 11
Haulage from freight depot.			. 14,0
Itemoving plano from depot			5.4
Crating furniture			20.0
Hotel bills, two persons, three days.			10.0
Total			865.1
Fifty Miles by Perriess	frack.		
M. Sweeney Company's charge.			\$30.00
Balance in favor of truck			\$15.1

total of net profits resulting are abundant evidence that the investment is worth while,

The adoption of the mechanical transport is not exactly analogous, it is true, but the example is of value in indicating that it is not always wise to decide against an innovation, simply because the economy is not apparent at the first view. Other factors enter into the installation of motor equipment, than a mere comparison of its cost with that of horse drawn wagons, The careful business man will not dismiss the subject until he has been thoroughly convinced that there is no way in which he may put the new system into operation with resulting profit.

That there are unlimited possibilities is borne out by the experience of those who have added to their business in a field closely allied with that in which they have been engaged. Those who have found that their regular line had not developed sufficiently to permit of using the truck to its maximum efficiency have been surprised to learn that it might be employed advantageously in other work a portion of the time. The experience of the M. Sweeney Company, Fall River, Mass., with three-ton Peerless trucks, made by the Peerless Motor Car Company, Cleveland, O., is of particular interest in this connection.

This concern has been engaged in a general haulage business for a number of years. About two years ago, it was brought face to face with the fact that modern conditions were such that it was being forced to turn away much work that was offered, largely because horses were incapable of undertaking the long hands involved.

In explanation of this latter statement it should be said that Fall River is approximately 22 miles from Providence, R. L. and that the railroad connections between the two cities is by no means commensurate with the needs in many respects. Passenger traffic is taken care of by an electric road, running express cars at frequent intervals, and while this line is available for freight purposes during certain hours of the night, much of the freight is sent by a roundabout way, or by boat. This condition has resulted in a decided demand for highway transportation for certain classes of goods, notably fruit, produce and other perishable products.

The M. Sweeney Company, as well as other concerns, have endeavored to supply this need, but, as readily may be conjectured, much of this class of work must be undertaken when the weather conditions are by no means the best for horses. In an effort to overcome the difficulties presented, the M. Sweeney Company secured a Peerless touring car in the fall of 1910. this being converted into a one-ton truck. The car was utilized primarily in hauling rush consignments to Providence, and was found particularly valuable in transferring pianos in Fall River. It is still in service, being employed practically all of the time in piano

The experience with this converted Peerless car was such that a few months after it was placed in commission, it was decided to purchase a three-ton truck of the same make. By this time, however, a new demand was created.

Several concerns in Boston had been engaged in delivering furniture and other merchandise throughout southeastern Massachusetts by motor truck. The reason for this venture, which proved a decided success from the beginning, lay in the fact that these houses learned that by utilizing mechanical transports they were relieved of the necessity for crating goods sold in this territory. The economy was made up in the elimination of freight charges, reduction in cost of packing, smaller force in the shipping department, and a number of similar items. Naturally, this meant much to the purchaser, who began to wonder whether or not it would be cheaper to move household goods by the same method,

The M. Sweeney Company decided to solve the problem at once. It was impossible to undertake this work with horses, and the only difficulty presenting itself in connection with the trucks was that of securing a satisfactory body. Robert W. Powers, the Fall

COMPARATIVE EFFICIENCY PACTORS.

Three-Ton Peerless Truck. M. Sweeney Company delivers furniture in Lynn, Mass.

Takes on load of strawberries for Providence, R. 1	72
Returns for second load	22
Makes second (rlp to Providence	
And returns to Fall River	22
Total miles covered in 24 hours 2	115
Hornes.	
Hou	
Four-horse team. Fall River-Lynn and return	
Two (we-horse leams, Providence and return	10
Total hours necessary to cover 208 miles on basis of one two-	
horse (eam	99
	68
Parving in time in layor of frack	4.5
Men.	
Hou	FB.
Two men on Lynn trlp (truck)	14
One man on Providence trips (truck)	1 11
	36

River agent for the Peerless, has been engaged in the body building business for years, long before the advent of the self-propelled vehicle, and his foreman had

Total hours on basis of one man (Iruck). Total hours on basis of one man (horses)

Saving in men's time in favor of truck....

Miles

little trouble in meeting the needs presented by this case.

The principal requirements of the hody were those of permitting compact loading and full protection for the load on the road. Provision is made for extending the top upward some 18 inches, so as to gain as much room as possible under the cover. This telescopic feature is worked out very nearly, sis of the uprights being bored to receive stay holts, which are fitted with wing nuts. Two men can hoist the top into its extended position. The dimensions of the body are such as to accommodate every class of household furniture, this being packed in the most advantageous manner. The roof over the main carrying compartment, as well as that over the driver's seat, is made of slat work, covered with water proof material, and side currains of

Worcester, and in Worcester, taking on another eargo for Fall River. If it were possible to make such connections all of the time, the conditions would prove ideal, but it is most generally the case that the return trip must be made empty. It is not to be presumed, however, that the estimate on the work is based on anything other than a fair profit to the transporting company. The long experience in handling goods of this character would preclude the possibility of mistakes of this nature, once the cost of maintaining the truck in service were determined within satisfactory limits.

On the other hand, it hardly will be expected that this class of service would be growing in demand if the patrons were not convinced they were saving money. Just how much is saved in this manner, depends of



Pirst Three-Ton Peerless Truck Purchased by M. Sweeney Company, Which Has Covered 10,000 Miles in Long Distance Work
During Past 15 Manths.

the same material provide complete protection for both load and driver in all kinds of weather

Since April, 1911, when the first three-ton Peerless was placed in service, it has been employed almost constantly in moving work. Of course, the demand was less pronounced at first, and its spare time, if such it may be termed, was utilized to advantage in the Providence freight hauls, or in other work about the city. At the end of a year, in April, 1912, it was found necessary to purchase a second three-ton Peerless, which also is employed in moving work a greater portion of the time.

The plan adopted by the M. Sweeney Company was that of looking over the goods and giving a flat price for the job. It often happens that it is possible to make one trip lead to another, as for instance taking a load of goods to Lynn, there to pick up a load for course upon the hail. Experience indicates that the greater economy to the individual householder is effected on the long hails, say within a radius of about 50 miles.

An accompanying tabulation sets forth the comparative cost of moving by train and by motor truck, the estimates being based upon a 50-mile hant. The rates between points differ materially, ranging from 15 to 20 cents for each 100 pounds. According to railroad officials, and it undoubtedly will be admitted that they have had wide experience in the matter of transporting household goods, the furniture for the accepacing or sisteom house would weigh about 3000 pounds. This is a conservative estimate, and it is possible that it might reach 4000, including piano. Rates for hauling such goods to and from the railroad station also vary, but \$10 a load will be considered a fair average, and \$\$ for handling the piano at either end is by no means excessive. The table shows that it would cost at least \$35 for transportation alone, to say nothing of the bill for crating and hotel bills while awaiting the arrival of the furniture. An estimate of three days on the road seems conservative, in view of the experience of many. If it should take longer, the balance would be in favor of the truck.

The M. Sweeney Company would undertake this job for \$30 or \$60, according to the amount of furniture. The family would spend the night at the old home, and the goods would be in the new house in time for installation the next night. The goods would be handled but twice, once onto the truck and once off again, as compared with six times, at least, under the railroad plan. The possibility of breakage, an item that was not considered in the table, would be minimized. Each truck carries a Pyrene extinguisher on the dash, so that danger from fire practically is eliminated.

It has been stated that this was work which could not be undertaken with horses. It would prove impossible, therefore, to attempt to compare the cost with that of horses. The M. Sweeney Company has kept careful record of the mileage obtained from the trucks, and of course this includes the tires and other equipment. It has been found impractical, however, to compile a statement which would show the actual cost of each vehicle, or to determine just what profit may have resulted from each.

This is due to a number of reasons. On some loads it is found necessary to send four men, while others require but two. Sometimes four men are employed in loading the vehicle, while other help is secured at the end of the journey for unloading. As has been stated, when not utilized for hauling household goods, the trucks are sent on the Providence freight hauls, or may be used for all sorts of jobs in Fall River. Seats have been prepared for all of the vehicles and they are utilized frequently in carrying picnic parties to and from the beaches and other resorts, at night or on Sunday.

They have never been overloaded, and seldom to their rated capacity. The No. 1 vehicle has been driven a trifle over 10,900 miles, and the No. 2 about 3000. The first set of tires on the No. 1 was removed at the end of 7900 miles. Thus far it would appear that the tire cost has been about 3.7 cents a mile. Such gasoline records as are available indicate that a fuel consumption of between five and six miles to the gallon has been obtained. Each truck is fitted with a governor which limits the speed to 15 miles an hour. In the matter of repairs, the company has been extremely fortunate in escaping accidents, and less than \$50 has been expended for new parts or adjustments on the two vehicles.

It will be noted that the M. Sweeney Company began its investigation of motor haulage in order to solve a certain problem. It was convinced that the motor truck would handle the Providence hauls to better advantage, if not with greater economy, than horses. The moving proposition did not appear until later. With its Peerless equipment, the company was prepared to meet the emergency when it arrived. Being thus prepared it was enabled to develop a profitable side line, if such it may be termed, which has become a decided factor in the business of the concern.

The Providence hauls are cared for without in any way interfering with the moving work. The trucks have been employed at times 21 hours of the day. When required one of them has covered 200 miles within 24 hours. Of course, horses could not be expected to compete with such service. After delivering a load of furniture in Lynn, leaving Fall River at 6 in the morning, the No. 1 truck has returned to Fall River at 7 in the evening, taken on a load of strawheries and delivered them in Providence, returning to Fall River a second time before 6 the next morning, two shifts of men being employed in the undertaking.

It can matter little whether such an installation will show an economy that can be measured in dollars and cents, at least to the extent of indicating just the amount saved. That these two three-ton Peerless trucks have proved efficient under every condition of service has been sufficient to indicate to the M. Sweeney Company that they have paid a handsome profit on the money invested. It is necessary only to add that when the converted Peerless touring car'was originally placed in service, the company was operating 26 horses. It still has 26 horses, and all future equipment will be motor vehicles. The company maintains there are certain kinds of work for which the horses are better adapted, but its experience with mechanical transports is such that it believes it the wiser policy to develop that end of the business,

Still another feature of the matter, and one which undoubtedly weighs heavily with the M. Sweeney Company in this connection, is the economy in barn room, or garage. An accompanying table indicates that were it considered practical to employ horses on long distance haulage-of this character, one two-horse team would need 92 hours in which to do the same amount of work. The saving in time in favor of the truck is fixed at 68 hours, suggesting that it would require at least four two-horse teams to do the work of this one three-ton truck. The amount of barn room necessary to house these extra horses and their wagons, to say nothing of the cost of feed, veterinary attendance, shoeing, etc., will represent an economy that cannot readily be reduced to dollars and cents, but which, nevertheless, is decidedly material in considering an investment of this nature.

A Flanders delivery wagon, made by the Studebaker Corporation, Detroit, was recently placed in commission by the Elk Cleaning & Dyeing Company, Cairo, Ill. It is the intention of the dyeing concern to use the automobile in making daily trips to Mounds and Mound City, where formerly a horse and wagon was used, three trips a week being made with it.

RECORDING DEVICES REVEAL EFFICIENCY.

Problem of Modern Transportation Methods Calls for Installation of Some Means for Checking the Various Factors Which Enter into the Final Solution.

EFFICIENCY and economy are more or less synonymous terms when applied to the solution of the modern transportation problem. Every business man understands the advantage to be gained through



Fig. 1—Servis Recorder in Its Metal Case, Open for Impection, the possession of a thoroughly dependable means of reducing the cost of production. This is a factor on

which much thought and computation has been expended, until the average manufacturer can tell to the smallest fraction of a cent just what the installation of every modern appliance means to him. It seems strange, therefore, that so little attention has been paid

to the matter of transportation charges.

Until the advent of the motor truck, business interests felt compelled to rely upon horses for transportation purposes within restricted limitations, and upon the established transportation companies outside of those districts. That the mechanical transport is capable of replacing both of these methods, at least in a measure, is the claim of its sponsors, and a claim which has been borne out in fact wherever it has been possible to give the proposition a

fair trial. However, there are certain factors entering into the problem, which cannot be dismissed without careful consideration.

It has been procen, time and again, that a given truck can do the work of a certain number of horse drawn vehicles at a specified saving in cost of maintenance. Business men are not disposed to question this proof, now that they are beginning to be able to secure accurate data as to the relative cost of horses and motors. However, this is by no means all there is to the problem.

It may be accepted as true that a three-ton truck, for example, will do the work of four two-horse teams, and at a cost which will show a saving, when these two equipments are placed side by side, that should leave no room for doubt as to which were the better investment. But if the business man in question has work for only two two-horse teams, then it becomes a subject for inquiry as to whether it would prove advisable to purchase a three-ton truck. This example is cited merely to indicate that the business man is wholly justified in giving the matter careful study.

It has been demonstrated that commy can be effected. The difficulty lies in bringing about that conomy, and it doubtless will be admitted the ultimate result will depend upon efficiency. Therefore, it becomes a matter of seeking the possibility of securing the utimost efficiency from the equipment, no matter whether it be horse drawn or motor driven.

Few business men will be disposed to venture the assertion that they are securing all of the business which rightfully belongs to them. They may have been giving rather more study to the production end, than a closer attention to the transportation end would have made necessary. This undoubtedly is a view-point which can best be left to the individual, but it assuredly is worthy of consideration.

It is necessary only to point to the fact that concerns which have given close study to the matter of loading and unloading, for instance, have found that they were able to handle a largely increased business without adding materially to the capital invested.



Fig. 2-Showing Some Suggested installations for the Servis Recorder, Which May Be Lorated Anywhere on the Car.

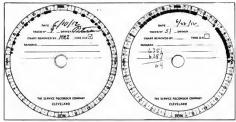


Fig. 3-Typical Servis Charin: At Left, Utilized by Mannfacturing Concern; at Right by Department Store Delivery System.

This becomes a matter of systematizing the transportation end in a manner which not only discovers the leaks, but offers an effective method of stopping them.

One argument that has been raised against the adoption of the mechanical transport, by some who have been convinced of its relative economy, is that it would necessitate the reorganization of the delivery system. Undoubtedly, this entails considerable expense, since some of these delivery systems mean the expenditure of much money, time, thought and attention. With such concerns it is necessary to point out some more efficient method of obtaining the results for which they are seeking, if they are to be expected to discard that already in force. Still, it ought not to be difficult to dispose of this argument, when it is possible to suggest methods that will eliminate leaks and effect a substantial saving.

Perhaps it was in an effort to meet this argument that travel recorders came into being. Certain it is that they would not have made their appearance had it not been for the fact that the more general use of the motor truck demonstrated their need. They were designed to detect and climinate leaks, just as quick loading and unloading methods were produced to increase the efficiency of the vehicles. They may be applied to horse drawn wagons, but their greatest usefulness is evident with mechanical conveyances. That they are to play an important part in the solution of the modern transportation problem seems unquestioned.

Irrespective of the method employed, the object of the travel recorder is to register every movement of the vehicle to which it is attached, in order that the owner, or the individual in charge of the transportation system, may have at instant command available data from which to check up the system in vogue. It aims to disclose not only how fast the machine is driven, but how much of the time is employed in useful work. If there are any leaks in the system, they ought to be made apparent, and those in charge should have no difficulty in determining monthe corrective-measure.

It follows that the travel recorder is calculated to become an efficiency factor, and as such must make for economy. That each type has some peculiar feature of merit. may be expected. It is not the object of this discussion to suggest the advantage of one type over another, but merely to present the need which they aim to fill and the claims made by the manufacturers of each, Those who are studying the complex problem of transportation undoubtedly will find the descriptions below of decided interest, and they may assist in suggesting a satisfactory solution.

The man in the box" is the name which has been applied to the Servis' recorder, made by the Service Recorder. Company, 2344 East 105th street, Cleveland, O. The designation is signally appropriate, since the device is enclosed in a neat little brass case, which may be located at any convenient place on the ear—on the dashboard, under the driver's seat, or as is the case with many department store vehicles, fastened on the wooden frame of the top above the driver's seat. It is claimed by the maker that so long as it is installed narallel with the axel it will revisiter.

The principle is one which may not have become noticeable even to many observant persons; that no motor car, horse wagon, locomotive, or other vehicle can be moved in a forward or backward direction without perceptible oscillation. Even the lightest running automobile cannot be moved across the garage floor without the recorder registering the motion. It is

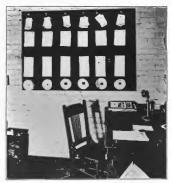


Fig. 4-Bulletin Board Record System Employed by Manufac-



Fig. 5-W. II. Brown's Travelog, Opened to Show Registering Mechanism.

claimed, however, that jarring vibrations and the like are not recorded as travel.

The instrument is patented and has two main mechanical features, the timing and recording mechanisms. The former is a specially designed Seth Thomas eight-day, jewelled movement, built and calibrated to withstand vibration, and securely protected in a sealed housing. It revolves a brass disc once every 24 hours, past a jewel pointed stylus, which registers travel and stop periods on a printed chart of sensitized paper which lies flat on the disc and revolves with it. The stylus, being attached to one end of a free swinging pendulum, marks a thin, clear line on the chart so long as the vehicle is quiet and the pendulum at rest. But when the truck is in motion the pendulum is agitated to and fro and the stylus records on the chart a broad "travel" line about 25 inch wide. It is said to be absolutely impossible to take these lines.

The chart is printed to resemble a 24-hour clock

dial, the smallest graduation representing a free-minute period. The travel and stop lines are registered faithfully on the margin of the chart, indicating the exact length of every stop and the duration of every travel period, as well as the exact time at which each occurred, so that the owner has at any time a detailed, legible, accurate record of the track's movements—a complete check on his vehicle. The value of this is, of course, obvious at once.

The owner or the delivery superintendent can tell at a glance whether his cars are working to their full capacity, whether the drivers are killing time, whether the trucks are

being delayed unduly on the road, whether the shipping clerk is holding them up longer than necessary at the shipping stations, whether they are being used at wrong hours, etc. In short, the recorder gives information concerning the efficient driver, ancovers the "boafer," discloses costly leaks of time in the shipping department, checks up overtime use of the trucks, puts a han on fast driving and consequent unnecessary wear and tear on the mechanism, by removing the temptation to loaf and then make up time on the road. Not only does the chart discloses the inefficient or poor driver, but it also brings to light the capable man, whose ability was perhaps not fully realized before.

Accompanying illustrations present the device and set forth its method of operation in a measure. Referring to the left of Fig. 3, this chart shows that the truck was started at 6:35 in the morning, and that it was busy making deliveries, some of them close to gether and others far apart, some stops being of short duration and others longer, until 11:30, at which time, it is presumed that the driver went to lunch. It resumed operations at 1 in the afternoon and continued its delivery work until 4:50, when it was through for the night. This chart shows one day's work with a manufacturing concern in Cleveland, O.

The chart shown at the right of Fig. 3 represents one day's work with a department store in that city. Here the driver was at the gravage just before 8 in the morning and took the truck around to the store, where it was standing until 8:50, getting its boad. It was busy making deliveries, with very few long waits, until 1:30 in the afternoon, when it returned to the store and made another short run before hunch at 2:20. After hunch it was driven to the store, loaded a third load and was busy muil 5:50. After returning to the store at this hour, there was nothing more to do that day, and it was driven to the garage, where it arrived at about 6:05, and was put up for the night.



Fig. 6-Front and Rear Views of the Brown Travelog Instrument, Lecked and Ready for Installation.

The manufacturing concern in question operates a battery of 3.5-ton gasoline vehicles, exclusively, in its heavy haulage work. Each truck is equipped with a ServiS recorder. In the garage manager's office hangs a bulletin board, shown at Fig. 4, upon which is kept in the vertical columns the individual records of each driver and his truck. In the top row, just underneath the truck numbers, are filed the gasoline requisitions, and below these hangs each truck's daily shipping record, showing tonnage, destinations, and time of arrival and departure as marked by the shipping clerks. On the next to the bottom row are the monthly record cards, showing the summary of the daily records of gasoline consumption, mileage, hours of service and tonnage hauled. The circular charts at the bottom are the ServiS record charts, used to check the shipping clerk's records, hours of service, overtime, and all stops and delays. In this particular case, the drivers insert the charts and the superintendent removes them. A spirit of friendly competition has grown up among the drivers and the record shown on the charts and the

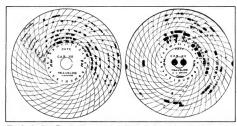


Fig. 7- Specimen Travelog Charts: At Left, Truck Hauling Machinery; at Right, Special vice is so sensitive that it

monthly expense summaries has resulted in two especially efficient drivers being given deserved increases in salary.

The department store mentioned bases its delivery system directly upon the ServiS recorder. Each morning the store timekeeper inserts fresh charts in the machines attached to the company's fleet of electric and gasoline wagons, noting on the charts removed the mileage of the previous day. He supplements this chart record with a delivery car report for a record of the number of deliveries, causes of delays of 10 minutes or over, and accidents or car trouble. It takes but a moment's glance at the chart and the driver's record of his delays; to inform the superintendent fully, and the knowledge that every minute's time during the working day must be accounted for is an effective moral stimulus to the driver. It is stated of one department store that the definite knowledge of certain savings effected by the use of these recorders was sufficient to pay for the instrument in two months' time. This is a usual report.

Another Cleveland product of the same nature is the Travelog, made by W. H. Brown, 706 Rose building. While it may be stated that the principle upon which it works is similar, it differs materially from that previously described, in that it permits the recording of an entire week's work, instead of one day only, The object sought is the same; namely, a complete record of the day's work, showing starting time, time of all runs and stops, quitting time, overtime, and all other details which will enable the owner or superintendent to detect leaks and suggest a remedy.

The maker cites the fact that although a large majority of men are conscientiously working for the better interests of their employers, the time clock has been found a necessity. These usually are installed indoors, where most of the work is done under the eyes of the directing foreman. If some method of detecting leaks is recognized as important under such conditions, it must follow that similar arguments will apply outside, where drivers are placed in charge of expensive installations that are utilized under condi-

> tions which limit the watchful supervision.

This does not necessarily imply that the driver is lax in his duties, as already has been pointed out. The object of the Travelog is to show where the delays occur, and it transpires more often than otherwise that these are due quite as much to the ronting system adopted, as to the inefficiency of the operator. The Travelog possesses a number of special advantages. as well.

The maker claims the derecords even when the ear is

touched. the principle employed being that it is actuated by the vibration of the car. The mechanism comprises an eight-day, 11jewel standard Howard clock movement, with actuating parts of cold rolled steel, enclosed in a pressed steel case and secured with a Yale lock. It may be located on any part of the car, a bracket attachment being furnished with the case.

Two of the Travelog charts are shown herewith, and it will be noted that provision is made for automatically making a whole week's record without removing the chart. The clock also is wound weekly. The instrument is installed with an open or glass front, possessing the added advantage of affording the operator opportunity to see his record in the making, as well as to read the time of day. The case is about 7.5 inches in diameter, and the chart is a six-inch disc of prepared paper divided into 24-hour periods indicated by radial lines with hour numerals at the centre, half-hours being indicated by halflines and shorter intervals being measured by sight. The marker traces a fine circular line while the vehicle is standing, and a broad band while running. Each succeeding day the marker drops toward the centre to delineate a new circle.

The Travelog chart at the left of Fig. 7 was made on a truck hauling machinery. In order to explain fully the runs and stops for the first two days, as an example, it may be stated that the first day, Thursday, the chart was put on at 11:30 in the morning. The truck was moving from 12:40 until 1: 1:25 to 1:35; 1:50 to 2:05; 2:15 to 2:20; 2:30 to 3; 3:30 to 3:55; 4:15 to 4:25, and quit for the day. Friday, the crew left the garage at 6:25 and drove to the storehouse, arriving at 6:35. It left the storehouse at 7:10 and was moving until 7:50. There was a wait until 9:15, after which it ran until 9:40, and ran as follows throughout the remainder of the day; 9:45 to 9:50; 10:15 to 10:25: 10:35 to 10:55, with short stops intervening: 11:15 to 11:50; 1 to 1:05; 1:10 for a short time; 1:45 to 1:50; 2 to 2:10; 2:40 to 2:50; 3:50 to 3:55 and 4:15. to 4:20, when it quit for the day. It also will be noted

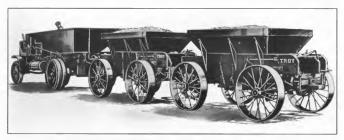
on another job. And thus the record goes on until the end of the week,

Wherever the Travelog has been given a trial it has demonstrated its value. In each instance it has been the means of detecting costly leaks, such as indicated in the chart given above at the right of Fig. 7. In this particular case the second week showed a considerably less loss of time, and the third week developed a saving of nearly 10 hours during the seven days. It is not difficult to estimate the amount of money resulting from a saving of 10 hours a week, year in and year out, and the initial cost of a Travelog under such circumstances is a decidedly minor consideration.

(To Be Continued.)

KNOX IN ROAD BUILDING.

Modern road construction is making good use of the motor truck. An accompanying illustration shows a six-ton Knox, made by the Knox Automobile Com-



Knox Six-Ton Truck Hanling Two Three-Yord Trailers in Road Construction Work in Sionx City, in.

that the truck began operations each day as follows: Friday, 6:25; Saturday, 6:45; Sunday, rest; Monday, 6:45; Tuesday, 7; Wednesday, 7; Thursday, 7; Friday, 7:20. It quit each day as follows: Thursday, 4:25; Friday, 4:20; Saturday, 4:25; Sunday, rest; Monday, 5:30; Tuesday, 5:30; Wednesday, 5:40; Thursday, 4:15; Friday, taken off at 9 in the morning.

The other Travelog chart was taken from a special ear on inght work. It shows that the crew boarded the truck at 5:50 in the afternoon of the 21st and started work at 7, going off at 11:30 the next morning. The second day the crew took charge at 6 and the vehicle was in service from 7 in the evening until 5:45 in the morning, with a long hold-up between 11:45 to 3. The 23rd the crew did not show up until 7:40 in the evening, and the truck did not start until 10:05, At 11:25 it was held up until 1:45, and the crew quit work at 6:40 in the morning. The 24th was Sunday, but Saturday afternoon the car was used for about an hour between 2:30 and 3:30 in the afternoon, evidently

pany, Springfield, Mass., hauling two trailers of three yards capacity each. Two of these trains have been in active service for the past year in Sioux City, Ia., and have made a remarkable record for efficiency, having delivered an average of 44.5 yards of material a day, the average distance being 3.5 miles.

Both truck and trailers are fitted with special quick dumping bodies, which facilitate delivery. The contractors estimate that it would have required at least 10 two-horse teams to have done the same amount of work, and that the cost of such equipment would have been more than twice as much as that of the Knox outfit.

Grades varying from three to 7.5 per cent, were negotiated without difficulty, and while the practise of hauling such heavy loads by this method on grades puts an unreasonable strain on the motor truck and therefore is not sanctioned by manufacturers, it nevertheless demonstrates the strength and power of Knox construction.

SIMPLICITY OF NATCO ONE-TON TRUCK.

ANUFACTURED and guaranteed by a company build their own bodies to meet individual requirements. In designing the power plant the company took the most intricate and complex parts for the leading automobile manufacturers, the Natco type 15 truck of one ton capacity will appeal to those seeking a high grade commercial vehicle capable of efficient service at a low cost of maintenance. Throughout the best of material and workmanship are incorporated and particular attention has been paid by the designer to interchangeability and standardization, important factors in the upkeep of the power wagon, facilitating as they do, the replacement of parts in the event of accident or wear.

506

Believing that specific service requirements must determine the character of the general as well as the detailed design of a mechanical transport, the National



Natco One-Ton Truck Equipped with Punel Delivery Type Body-The Delver in Located at Left with Motor Under the Deck, Design Providing Suximum Carrying Space.

Motor Truck Company, Bay City, Mich., which is nuder the same management as the National Cycle & Manufacturing Company, has placed the motor under the deck, making for ease of operation where the streets are narrow and traffic congested. The company also points out that its product is particularly adapted to transportation where frequent stops are made, and among other features emphasized is that of an even distribution of load, approximately 60 per cent, being on the rear wheels, and 40 on the front, an arrangement making for efficient traction as well as effecting considerable saving in the cost of operation. A number of standard body designs are produced by the company, these including panel, screen side, express and stake. Bodies of special design and dimensions are constructed to suit the requirements of the purchaser, and the company also furnishes frame prints with scaled dimensions to those who desire to

In designing the power plant the company took into consideration the fact that many trucks are driven by inexperienced operators and it was maintained that to produce a highly efficient motor it should be fool proof and free from complicated devices with which the chauffeur could tamper. The matter of control is not regulated by any form of governor other than the fixed ignition, the company holding that the simpler the design the less temptation is presented for experimentation upon the part of the driver.

The Natco motor is of the short, compact, longstroke type, its bore being 3.5 inches and the stroke five, a ratio of stroke to bore of 1.43 to one, and providing a piston displacement of 192.2 cubic inches. Although the S. A. E. formula rates the motor at about

> 20 horsepower, it will develop greatly in excess of this because of its long stroke. It is also pointed out that the long stroke favors economy in fuel and registration fees, and that maximum service is assured with minimum adjustment.

The four cylinders are cast en bloc of a high grade material and are carefully machined and ground, tested and subjected to a rigid final inspection. The same careful methods are utilized in the construction. machining and finishing of the pistons and rings, these being held to fine limits, a practise insuring even compression on each cylinder, as well as efficiency.

The crankshaft and camshaft are of a high grade steel. accurately ground to size and

rotate in generous bearings having an extreme low bearing pressure a square inch. The connecting rods are also of high grade material, the wristpin being carefully retained and fitted and so designed that it is properly lubricated at all times.

The inlet and exhaust valves are located on the right hand side of the motor, are of liberal size, and the springs, etc., are fully enclosed, a design making for efficiency of operation and economy of upkeep. Although all foreign elements are excluded, the member may be reached easily when desired, the retaining plate being neat in design and readily accessible; in fact, throughout the Natco motor is noticeable for its simplicity.

In locating the carburetor the designer has placed it at the left of the motor with the magneto at the right, a commendable location, as any possible chance for fire through a spark from the ignition member is



Chasals of Natro Truck, Nationable for Simplicity and Accessibility of Parts, Which Are High Grade and Carefully Flaished—Note Compactness of Power Plant and Straight Line Drive.

eliminated by this construction. A feature of the carburetion system is that the intake pipe is short, free from bends and curves, and being carcinlly machined and fitted to the cylinder prevents possible auxiliary air diluting the mixture. Control of the gas is by lever on top of the steering wheel and a feature is that the member is extended nearly to the rim of the wheel, permitting the driver to actuate the lever without removing his hand from the wheel.

A true high-tension magneto is employed, gear driven with pinions enclosed, and the spark is fixed: that is, its time cannot be advanced or retarded by the driver, it being held by the company that it provides the ideal system for commercial echicles, which should be operated at a moderate speed, and that improper advance of the spark is prevented. It is also pointed out that greater efficiency will be derived from the power plant, as the spark will occur at the proper position of the piston, climinating too early ignition and undue stresses thereby upon the working parts of the motor.

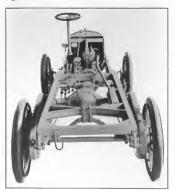
Believing that the life of a motor and the maintenance of its maximum efficiency is dependent upon constant and uniform lubrication, the maker of the Natco truck utilizes a novel system which is presented in an accompanying illustration. It is a well established fact that excessive lubrication results in the rapid formation of carbon, and that eventually the accumulation of deposits causes heating, loss of power and pre-ignition.

A positive, mechanically operated system is claimed for the Natio method, the notworthy feature of which is that although the lubricant is employed over and over again, it is filtered before it is delivered to the pump. It will be noted that the main reservoir is located at the bottom of the crankease and has a capacity of six quarts. The pumps, which are gear driven from the camshaft, are located in the forward compartment from which lead pipes, these supplying the lubricant to the end bearings of the crankshaft and to a sight feed device in full view of the operator.

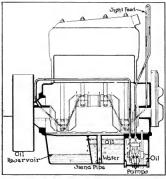
The passage of the oil will be noted by the dotted lines, and after Inbrigating the parts outlined in the drawing, the lubricant returns to the main supply tank through a standpipe, the latter extending to within 375 inch of the bottom of the water compartment as indicated. Owing to the difference in the specific gravity of oil and water, the former rises to the top and overflows into the main reservoir. During its passage through the water the carbon is separated from the oil and the precipitations fall to the bottom of the compartment, whence they may be re-

moved easily. Another advantage emphasized by the designer is that the oil is cooled, maintaining its value. The capacity and design of the system are such that the supply requires replenishing but once a month.

As the commercial vehicle is operated at low speeds and the motor is frequently left running when discharging loads, the subject of cooling has been given thoughtful consideration by the designer. The water jackets of the motor are liberal in size as are the inlet and exhaust pipes, assuring proper flow of the third at all times. The cosled fluid enters the motor at the left hand side and after circulating through the jackets and around the valves, etc., passes out through the manifold at the top, thence by a pipe of large diameter to the radiator. The later is of the



The Frame is Stardily Constructed and Securely Braced by Cross Members-Note Method of Supporting Auxillary Spring.



The Natco Olling System is Novel, the Lubricant Being Filtered through Water to Remove Carbon and Impurities.

vertical tube type, having ample water capacity, and it is suspended by springs, eliminating all road shocks as well as stresses. Cooling is also assisted by the flywheel, which is fitted with fan shaped blades, these drawing the heated air from around the power plant and expelling it at the rear of the chassis.

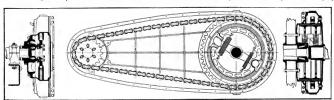
Power from the motor is transmitted through a cone clutch and shaft to the transmission. The clutch is faced with leather, also equipped with compression springs, these eliminating harsh engagement and slipping, as well as providing means for adjustment. A straight line drive is provided from clutch to transmission, thereby delivering full efficiency of the motor to the driving sprockets.

A selective type of transmission is employed, providing three speeds forward and reverse, and all gears are of a high grade material, carefully cut and operate in liberal sized bearings. The transmission case is oil and dust proof, provided with ample sized inspection cover, and is secured to the differential and jackshaft housing. Interposed between the latter and the chutch are two cross members, these being of sturdy construction, and serving to carry the brake equalizing mechanism and torque rod. The latter is securely braced to the transmission housing and extends forward, where it is attached to the front cross member. Its design and that of the jackshaft housing make for a rugged construction as well as accessibility of parts. In this respect the large inspection cover to the differential is worthy of consideration as the gears and bearings may be reached easily and any desired adjustments made. The supply of lubricant may be replenished through a filler plug on the top of the housing.

Final drive is by chains, and elongation and unnecessary wear of these members through exposure to dust and foreign elements is prevented by the utilization of a chain case. The latter is supported at the aske end on the steel brake shoe support, which is riveted solid to the main case casting, the upper end being supported by an eccentric adjusting member. The distance between the rear axle and jackshaft may be increased or diminished by rotating the chain case adjuster on the countershaft end housing by means of a spanner wrench, the rotating and stationary parts being permanently locked when the desired adjustment of the chains is obtained.

A micrometer adjustment is provided on the stationary and rotating members, this facilitating the work as well as insuring accuracy and enabling a parallel alignment of countershaft and rear axle. In performing the work the chain case is not disturbed. Being oil tight and dust proof, it insures high efficiency as well as long life to the sprockets and chains. Provision is made for replenishing of the supply of oil through the medium of a filler cap, this being located directly over the rear sprocket.

Steering is by the conventional hand wheel, located at the left, and the gear is of the worm and wheel type, semi-reversible. The brakes are ample in size, of the internal type located on the rear wheels. The service member is operated by the right pedal, which also actuates the clutch, while the emergency is operated by a pedal at the left and is provided with a ratchet lock. The gear shifting lever is slightly at the left of centre and at the right of the driver. It will be noted that the control is simple, and that only when changing



Driving Chains Are Enclosed in Dust and Oil Proof Cases, Making for Long Life—A Feature is the Provision for Accurate Adjustment and Alignment.

Digital by Google

speeds is the operator obliged to remove his hand from the steering wheel, an arrangement making for safety when operating in crowded traffic.

The frame of the Nateo is of very substantial design, of presend steel channel sections, and is unusually well braced by cross members, especially the X section to which is secured the supplementary transverse spring. The channels are very deep, insuring rigidity as well as stability as is the sub-frame supporting the power plant.

Semi-elliptic springs, 2.25 inches wide and 39 long, are titted in front, the rear being of the same design, but 32 inches long. Ample provision is made for the labrication of the spring shaekle bolts, two grease cups being fitted to each member. Rectangular section axles are employed both front and rear. Solid tires, 36 by 3.5 inches, are utilized on detachable rims, both front and rear. The wheelbase is 104 inches, tread 56, and the weight of the chassis 2400 pounds.

WHITE TRUCKS IN RUSSIAN ARMY TRIALS.

FORTY-FIVE cars and trucks took part in the recent road trials conducted by the Russian government for the purpose of determining the adaptabiity of motor vehicles for army service in all its branches. Of these, five were White machines, made by the White Company, Cleveland, O., and it may be said that America's representation in the tests compean manufacturers was represented, including the makers of the Mercedes, Benz, Napier, Saurer, Clement, Lancia, Berliet, Charron, Laurin, Buire, Vauxhall and others. The run during the last three days was made at high speed over hard, rough roads, and was estremely exacting. Thirty-five cars finished the trip, among which were the five White contestants, with a



(see Victorias inspecting the White Squadron at the Specessful Completion of the Recent Bussian Army Beliability Han-

ducted themselves with all due regard for the comtry of their origin. They were two fix-epassenger, 30 hor-repower touring cars, two 30 horsepower ambilances utilizing the regulation White three-quarter ton classis, and one L5-ton capacity, 30 horsepower truck, fitted with tank body for carrying the firel supply for the tour.

The route covered started from St. Petersburg, circled around through Moscow, and then returned over a different course to the Russian capital, the entire distance traversed being about 1900 English miles. The road conditions were indescribable. In many places there were no roads at all, the course being across sand hills, over fields and plough ground, and through forest trails. The best idea of the travelling conditions may be gained from the fact that it was necessary to precede the tourist by a detachment of army bridge builders in order to make it possible for the cars to get through at all.

Besides the White entrants, the flower of Euro-

record for a lower fuel and oil consumption than any of the European machines. Each of the five came through the entire trip without mechanical trouble of any description, and created the most enthusiastic admiration of the Russian officials who supervised the tests.

At the conclusion of the trials, the surviving contestants were assembled at Peterhoff, where they were personally inspected by the Czar, the minister of war, and the high officials of the Russian army. The White squadron came in for the lion's share of the Emperor's attention, and an accompanying illustration shows him inspecting the fleet. The Czar is standing just to the right of the telegraph pole, while the third figure to the left of the pole is Gen. Suchomlinoff, minister of war. The officer standing at the Czar's right is Gen. Dobreeshin, who was in command of the trials.

After the royal inspection, all of the contesting cars were completely dismantled and every part was subjected to a most careful scrutiny for wear and deterioration. The commission of experts which conducted this examination reported that every one of the five White cars and trucks was in absolutely perfect condition. This report was followed by another from the army officials certifying that the White cars were highly suitable in every respect for the requirements of the Russian army service, and recommending that the entire fleet be purchased by the war department. The next day the squadron became the property of the Russian government

The result of the trials and the subsequent action of the Russian army is naturally very gratifying to the White Company, particularly as the machines won in a most severe contest against the representative cars of Europe. While practically all of the foreign made machines were looked after by factory experts, the White team was taken care of by men from the Loudon office of the White Company and its agency in St. Petersburg, no factory representatives being present,

One of the significant features brought out by the competition was the fact that the White car, conforming closely in general design to Enropean ideas and operate a motor car to advantage, and in almost every instance the conditions in this respect are such as to test the capacity of the commercial vehicle unduly. William Spink, manufacturer of velvet and axminster varus, has not hesitated to adopt motor transportation, however. After giving the matter thorough investigation, he decided upon a 3.5-ton G. M. C. gasoline truck. made by the General Motors Company, Detroit, to which a special type of body was fitted, capable of carrving the varus to the best advantage. As yet he has had no reason to regret his decision, despite the peculiar street conditions.

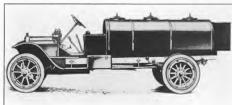
DURABLE DAYTONS CREATE SAVING.

Two durable Dayton five-ton trucks, made by the Dayton Auto Truck Company, Dayton, O., have been used with remarkable success for several months by the Dillon Teaming Company, San Francisco, Cal. The vehicles are used in and about San Francisco for hanling brick, and many times have been called upon to travel steep grades. They are equipped with side

dumping bodies and carry 2000 brick to the load, a weight of about 12,000 pounds. Recently brick was carted to Presidio. a distance of seven miles. Three trips a day were made, each truck carting 6000 brick. Teams formerly used in this work made but one trip a day. carrying 1000 brick, so that it can be seen that one truck does the work of six teams. Comparative figures kept by the company show that the cost of operating a truck, figuring in-



terest, depreciation and costs practise, has, by a combination of American genius of materials and supplies, is \$14.92 a day, while the cost for the six teams which it replaces, would be \$36,



White 1.5-Ton Truck Which Carried the Fuel Supply for Bussian Army Trials.

and American advanced methods of manufacture. reached a degree of perfection not yet attained by the a saving each day of \$21.08 in favor of the truck. very machines from which it was originally designed.

WINTER GENERAL MANAGER.

H. L. Winter has resigned his position as sales manager of the Federal Motor Truck Company of Detroit and entered the employ of the Universal Motor Truck Company of the same city as general sales manager. He left Detroit recently on a trip, which will take him to all the agencies of the concern in the country, and which will enable him to become acquainted with the trade and its need.

HAULING YARNS WITH G. M. C.

Those who are familiar with the topography of Manayunk, Penn., a suburb of Philadelphia, do not need to be told that the grades are decidedly excessive. On many streets it would be extremely difficult to

MOTZ TIRE SERVICE.

It makes no difference whether the car is electrically driven or propelled by gasoline motor, or what kind of light delivery duty it performs, according to the Motz Tire & Rubber Company, Akron, O., it will be found advantageous to come it with Motz cushion tires. Three distinct advantages are claimed to the commercial vehicle owner; protection to the delicate mechanical parts of the car, saving in power and saving in tire expense. This last item is based upon the guarantee of 10,000 miles, sufficient to give the average owner two years' service,

John N. Willys, president of the Willys-Overland Company, Toledo, O., has been elected vice president of the Hexter Motor Truck Company, New York Cny, metropolitan agent for the Gramm truck.

ELECTRIC WAGONS IN POSTAL SERVICE.

Motor Delivery Company, Working Under Horse Contract in New York City, Meets
Every Department Requirement and at an Expense Less Than the Estimates for
Haulage—Practical Accounting and the Results Obtained.

By William W. Scott.

THE endurance of the electric vehicle under particularly exacting conditions is illustrated by the service of the Motor Delivery Company of New York City, which was inaugurated early in the spring of 1909 and has been continued since that time. In a period of more than three years during which the work has continued uninterrupted, a record has been kept that will account for every foot of distance each wagon has been driven, and every cent expended for operation and maintenance of each machine, so it will be understood that what can be stated of this company has been three.

of his business life he has been engaged in animal haulage. It has been necessary for him to familiarize himself with every detail of trucking and expressage services, and having charge of departments and organizations necessity has impelled him to specially direct
his attention to subjects that under ordinary circumstances might not be regarded as important. Or, to
put it another way, Manager Bardwelf's experience
has been such that he has been required to educate
himself in every phase of vehicular transportation, at
least to the standards of the large contracting conleast to the standards of the large contracting con-



The Interior of the Garage of the Motor Delivery Company, Lawrence Street, New York City, as Seen from the Entrance, Showing the Types of Wagons in Service.

oughly established by actual experience, and should not be regarded as approximation, estimate or theory.

This is a service exclusively of electric wagons and it was begun with new machines, so that there has been opportunity to reach determinations by close and systematic observation of the work accomplished, and to profit by each experience. The company has contract for transporting mail between the sub-stations of the New York potential, and the street on the west side and to Fordham on the east side, hauling collections from the one sub-station to another and from them all to 42nd street, which is the central point for downtown delivery, and delivering mail for distribution from 42nd street station to the other sub-stations.

Manager Bardwell of the company has had a long experience with highway transportation, for he was identified with several concerns engaged in this work, both in Boston and New York, and as with these horses were need it may be said that the greater part cerns with which he has been associated, and this knowledge has been of decided value to him in working out the problems that have been met with in his administration of the Motor Delivery Company.

There are those who will comment upon the emphasis laid upon Mr. Bardwell's experience, and will observe that a man associated with handage contractors of New York and Boston ought to be thoroughly informed. It this comment can be created the purpose of the writer has been accomplished, which is to demonstrate that a man who had had only horse experience has taken up motor vehicle handage, and, while having good advice and no doubt profiting by it, has had to meet conditions which would not under ordinary circumstances, at least, he met with by the average concern conducting a transportation business or making its own delivery.

To illustrate: It has been the custom of most firms and individuals requiring the use of highway transport to experiment with motor vehicles, using



Corner of the Main Garage Floor Given Over to the Cure and Maintenance of the liniteries,

them in connection with animal wagons and determining from experience with a small number of units what changes from the old methods or system appear desirable. There are few concerns, even those controlled by men in every way conversant with and confident of the utility of the motor wagon, that have transformed their service from animals to power conveyances without a period of experimentation and as a rule the transition has been gradual.

As a matter of fact, it can be said that until comparatively recently there was even a disposition to wait and profit by the experience of those who were regarded as more venturesome. With large propositions, with a haulage expense aggregating hundreds of thousands of dollars annually, from five to eight

years has not been considered too long a time to conduct investigation, and it is only within the past two years that there has been realization that the power wagon has the qualities and economies claimed for it. Today thousauds of firms and businesses are experimenting along the line that has been specified. and there are a few that have been so satisfied with the results that they are doing all their work, and with a varying measure of profit and economy, with power vehicles.

Previous articles relative to the use of the electric wagons have demonstrated the facts stated. They have shown conclusively for certain work that these machines have been a distinct advantage—such qualities as justified their use, and this in metropolitan hanlage. where the trips are slower than they might be under other circumstances because of traific delays and obstructions. But in every justance these articles have been descriptive of lengthy trials, and where the initial installations were necessarily limited as to productiveness because of conditions for maintenance and care, and lack of practical knowledge precluded economies that were later realized

The foregoing is meant to impress upon the reader that the Motor Delivery Company, when it was organized, was probably the first concern in

America to engage in business with electric vehicles exclusively, and probably the first to be created for engaging in a power wagon service where its earning capacity was limited and it would have to be so managed as to be profitable with a restricted revenue.

Now it should be understood that the United States Postoffice Department makes contract for transporting the mails. The work is defined by the postal officials and each contract is advertised and the public is nivited to submit bids for what is specified. There is no restriction as to the number of contracts that may be bid for, but all else being equal the lowest compensation generally is the basis on which the contract is made. The specifications of the work set forth in detail exactly what must be undertaken, the minimum



distinct advantage-such qual- The Charging Panel Located in the Office of the Matter Delivery Company, Convenient to

General Vehicle 4000-Pound Electric Wagon, Used for Mail Transfer by the Motor De-

volume of matter that must be carried, the number of trips that must be made, and other requirements. As government contracts have the merit of furnishing a constant and unfailing revenue, and there are none of the uncertainties that might be experienced in ordinary business, the fact that the income is limited, and perhaps comparatively small, is in a measure offset by an assurance of continuous work at a uniform price.

The experience of the postofice department is that the volume of mail handled increases annually, and it is natural to expect that each year the work required will be more than for the preceding period. Just what provision is made for this increased haulage in the contract is not material, but the contract compels the contractor to carry whatever volume of mail is accumulated, in either direction. During certain periods of the year the mails are unusually large and this necessitates additional convexue.

ces. This is particularly true of the holiday season and the first of the year, and at other times when there are occasions for more than normal correspondence. Ho we've'r, the work is more uniform than might be expected by those who are not well informed.

But in the government service the contractor has comparatively little discretion. The postal officials determine the number of routes, the schedule time for leaving from and arriving at the different substations, and the manner of protecting the mail in transit. The contractor must furnish sufficient conveyances to meet any need that can be reasonably forecasted and he is required to

make the trips at a regular rate of speed. This applies to each day the entire year. No matter what the temperature, whether the sun be stifling or the mercury below zero: whether the rain fall in torrents or the streets be hub deep with snow; whether the roadways be level asphalt or the paving be broken and rough: whether the traffic be light or heavy; whether the obstructions be many or few, the mail must be carried in the time allotted for the work or the contractor is immediately in difficulties

Of course it sounds well enough to those who have

had no experience with New York traffic to say that a reasonable time for the trip is allowed, but as this delivery or mail transfer is a part of the gigantic government system it must be a condition utterly beyond the control of the contractor that will be regarded as a valid excuse. By this is meant such delays as at an open drawbridge, blockade occasioned by an accident from which the driver could not extricate his machine. or a happening of like nature. A vehicular mishap is not to be considered. Of course there is this factor, that the contractor's vehicles have the right of way over all traffic, and there is a heavy penalty for those who wilfully or intentionally obstruct them, but the experience has been that there is none too much time allowed by the schedules, for moving through New York traffic is not like boulevard driving.

New York streets are notoriously bad so far as pay-



Three-and-a-Half-Ton Truck, the Largest General Vehicle Wagon in the Service of the Motor Delivery Company.

D#146#-8	**								
162061	touter	Ting a r ja	Nome.	1 0	100	TIME	974R7	710180	19.74
		+		\vdash					
			<u> </u>						
						<u></u>			L_

Mail Driver's Dully Report, on Card for Filing, Four inches Length and Six Inches Width, Printed on Both Sides,

ing is concerned. Undoubtedly the work is poorly done, although the cost is relatively high, but one reason that cannot be denied is that the roadways are constantly torn up and relaid because of differing underground constructions, and the paving will settle unevenly and, unless freshly asphalted, be so rough as to preclude a rapid pace of vehicle save at a corresponding ratio of vehicular deterioration. Then to maintain a schedule on such streets means a relatively greater degree of wear than would be experienced were the driver to drive as occasion should demand regarding maintenance coronomy. For instance, if the streets could be chosen and time taken to drive on them, the wear on the wagous might be materially lessened.

The Motor Delivery Company was organized to transport mail and it bought a horse service that had the contract for the work. This brought the company to a horse basis so far as the price paid was concerned, and there can be no change until the contract has expired and another entered into. This necessitated initial expenses that have to be considered in the accounting, for a garage was built in Lawrence street, Harlem, this being a single-story brick structure that has a capacity of about 40 machines. It might be practical later on to add a story or two to this, but there is no basement. There is no income from the building, and the cost of the garage to the company is more than were it larger and part rented and a revenue received from tenants, although the capital required would no doubt be greater.

When the garage was built the company took up the contract work with 22 General Vehicle Company electric wagons, these being of 1000, 2000, 4000 and 7000 pounds capacity, and because of uncertainty as to what might be required it was believed that some garage business might be developed. Accordingly a gasoline tank was installed and a series of steel lockers intended for the use of the owners and drivers of customers, set up, but it was found that it would not be practical to take any volume of outside patronage and what might have been developed as a public service station business has been devoted practically to attention to the vehicles which have been found necessary to carry out the company's contract.

Now the company has 28 electric wagons, which are of the following capacities: Seventeen of 1000 pounds, five of 2000 pounds, four of 4000 pounds and two of 7000 pounds, all of which are fitted with two body types, the 1000-pound wagons being equipped with what are known as convex full panel bodies, with front corner posts, and the others having express bodies with standing tops, with the sides protected by heavy wire screen and side curtains that may be dropped in the event of storm. The larger wagons are fitted so that the drivers are protected by storm fronts in the event of rain or snow.

The service of the company goes on day and night, although the greater part of the haulage is done during the day and up to midnight, but there are wagons on the streets practically all the time. It is not possible to give the work of one machine as being representative, for there is a wide difference in requirements, but the daily mileage is approximately 1000, with mileages of approximately 666 and 500 for holidays and Sundays, This, allowing for nine holidays and 52 Sundays each year and 304 business days, aggregates 336,000 miles annually, or 12,000 miles for each wagon. This would allow an average of 32.9 miles daily for each machine. but as there are the lessened mileages of Sundays and holidays to be considered, and the fact that the larger wagons are not used regularly, it will be seen that the average of each vehicle will closely approach 40 miles daily. In fact, some of them will somewhat exceed 40 miles, as will be shown presently.

Now it is evident that if a schedule is allowed for each trip, and this must be maintained as closely as is possible, there must be an excess or reserve equipment, and what is required is represented by the 28 wagons. The 1000-pound wagon is found to be especially serviceable because the loads are not large, but the trips must be made frequently, and to operate larger wagons would be unprofitable. The problem is to employ the sizes which will best serve the purposes and be the most economical. When the needs increase it is best to employ wagons of greater capacity where this can be done, and so the 7000-pound wagons are distinctly useful when the haulage is very heavy.

But the wagons at work must be worked unless it is impossible to do so. If a machine becomes disabled

70744 HG 10% IN	-	
144.164		

Reverse of (and for Mail Driver's Dally Report.

the garage is notified and a spare wagon is sent to the point where it is wanted, the mail transferred and the trip continued, and if a repair or an adjustment is required the wagon is kept moving to schedule until it is relieved. If a tire is shed the wagon is stopped only to call the garage and ask for a relief wagon to meet it along the route, and it continues on the rim until the load is transferred, when it is sent back to the garage for repair and a new shoe. There must be no waits and no stops if these can be avoided, because there is always possibility of delay and the need of all the time available to keep up to the schedule.

Because of the possibility of demands for the machines in the garage at any time those not in service are kept with the batteries as near full charge as can be done, and so there is seldom a period in the day when some of the wagons are not being "boosted," while repair work is also in progress much of the time. Each wagon is worked as much as is practicable and

ods the wagons must be changed oftener and the batteries must be charged systematically. While there are excuses possible for all other classes of traffic the mail must not be delayed and the responsibility falls upon the management for every second that is lost.

It should be stated that the company has a considerably larger mileage to serve than was provided for in the original contract, this because of the elimination of some of the means of transportation, principally trolley mail cars, and the elevated road trains. Various conditions brought about the need of changes and the most practical solution of the problem was by adding these routes to those covered by the Motor Delivery Company's contract.

No doubt the reader has inferred that there was considerable uncertainty in the first year's service as to just what could be accomplished and it might be said the work was more or less experimental. It was found that six additional wagons were necessary and

DATE			RE	CORI		TIRE						
	JANE	ARY	PEBI	RUARY	MA	RCH	AP	UL	>	IAV	Jt.	NE
Day	Miles	Repairs	Miles	Repairs	Miles	Repairs	Miles	Repairs	Miller	Repairs	Miles	Repairs
Patriant												
1												
2		-			_	+			_	\perp	_	1
1		1	-						-			
29		1						1			-	
30		-	-	1	-	+		++-	-	+	-	
 31		-	-	-	-	+		1	-	+		++
			Purchan	Prior	5	-		1	Life of	Tire		-
			Repairs		3				Miles			
			-	ap Value	3	-	-		Cost p	er mile		

Form of Daily Record: These Sheets Ace Kept for Vehicle, Tire and Battery Accounting and Each Will Contain a Year's

each driver has a route that he must cover. For instance, one man's work means that he must make nine trips, each of seven miles, this making a total of 33 miles, which is done with two wagons, one of which must be driven 28 miles and the other 35 miles. Another man has a route with a total drive of 76 miles in three wagons, and another must drive 73. The trips range from 9.5 to 19 miles for the round trip.

The wagons are kept up to the schedule and the consumption of current is economized so far as this may be done, but in the winter, when the snow is four or more inches in depth, it is found that the mileage is decreased materially, this being due to the fact that the snow is swept from the car tracks into the roadways and from the sidewalks into the street, increasing the depth for the time being so that all traffic is impeded. While such conditions do not continue for more than two or three days at the most, during these peritant was the such conditions do not continue for more than two or three days at the most, during these peritants was the such conditions do not continue for more than two or three days at the most, during these peritants.

they were added, and this precluded any material revenue from garage service. Besides, it was necessary to devote a section of the floor to the battery department. That there shall be no delay from accident or failure of batteries several spare installations are kept, and these are used as often as is necessary to maintain efficiency. so that charging and testing of batteries as well as repair and maintenance of cells is an important and constant work. The moment a battery loses capacity in any manner it is removed from the wagon and another substituted, so with the use that is given a mileage of from 10,000 to 11,000 can be depended on, and a battery will serve from 10 to 11 months as an average. It is understood, of course, that lead batteries are used with the wagons. The batteries are given good care and are flushed frequently and equalized regularly, being tested carefully for possible causes for deterioration. As it is necessary to "boost"

the batteries, especially with the smaller wagons, there is perhaps a slightly lessened life than were the charges and discharges to the capacity. While the battery department is merely a section of the garage floor, it has the advantage of being well lighted and there is sufficient space for any work that may be necessary.

The charging board, which has a capacity for 24 vehicles, is located in the office of the company, and it is an excellent equipment, although the apartment is decidedly limited for space. Here, however, it is under the observation of the foreman and the manager. and the records may be conveniently kept. These are the advantages of the location.

The system of accounting for the service is extremely practical and complete. Nothing that is dework he is called upon to do. Because of the nature of the work for which the wagons are used the repairing must be done whenever the conditions will permit, and provision must be made for any exigency that may arise. As the repairing is systematized the first report is made by the driver, who is required to fill in a card giving his number and the date, and then is entered the number of the vehicle, the number of the battery, the number of each of the four tires, the time of starting and the time of returning, the readings of the odometer at start and finish of the day's work, and the total number of miles travelled. To this the driver subscribes his name and gives his address. On the reverse of this card is a lined space for a report under the head of "remarks" and at the foot is a blank for

VEHICLE INSPECTION REPORT.

Date, CONTROLLER Are fingers in good condition and making contact..... Are contacts in good conditian Are all connections tight. Were contacts wiped with vascline cloth

Are snap switches in working order STEERING GRAD

EERING GEAR
Are sector and pinion in good condition.

Is steering lever tight.

Did you oil lower steering post bracket hearing.

Was sufficient grease in cup for steering head pin.

is one turn given this grease cup cap daily. ls one turn given this grease cup top unit;
Has upper steering post been olled dully.
Did you oil double bearing under floor.

Are all boits, nuts and screws in place and tight.....

Is belt in working order......

Are motor leads in gord condition..... AXLE AND SPRINGS

Are springs in good condition..... Are axies in good shape. Are spring hanger rivets tight. Are all frame rivets tight.

WHEN S.

Are chain speckets on rear wheels in good condition

Do front wheels line up properly.....

COUNTERSHAFT

INTERNHAPT
Are countershaft aprockets in good condition
Are Morse gear and chain in good condition
is Morse chain tubricated twice a week
is Morse chain cleaned monthly
to Morse chain reportely adjusted.

Are countershaft bearings packed with non-fluid oil every three months ... Are roller chains cleaned in gas and soaked in heavy oil

every two weeks.

Are roller chains praperly adjusted...

Are nuts on radius rods, connecting rear axis to countershaft, tight.

Are brakes properly adjusted and in good working order . . . Are brake band pins and taggles in good condition......

Are all tires in good condition considering the distance they have travelled,....

BODY

Is all woodwork in perfect condition If not, what is wrong..... Are wire screens in perfect condition.
If not, state what is out of order.
Are all four lamps in good condition and working. lines roof lenk

Vehicle laspector's Report, Printed in Black on Both Sides of White Paper, 12 Inches Leugth and Nine Inches Width.

sirable is lost sight of and every record is well maintained. The charging form is simple, being designed to have sufficient entries for every charge given at the station, no matter the number daily, giving the identification number of the vehicle, the time when charging was begun and the amperage and voltage readings. and the time when charging was concluded and the amperage and voltage readings, together with the check. Each day's sheet is preserved in a file. From this sheet a note is made of the current used for each charge. This is credited to the vehicle.

The garage organization includes a foreman, two repairmen, a battery man and an assistant, and a "combination" man, so-called, who can assist in whatever

entering the number of hours in service. This card is presented to the foreman, who certifies that the report is correct, which requires that it be verified by him, and on the basis of this report any repair or adjustment is ordered.

A time card is made out by the foreman and the work is performed by the mechanics or the battery men, and for any parts or supplies needed requisitions are made out by the foreman. These requisitions are in turn charged to the vehicle by number. The parts are accounted for at the cost price to the company and the supplies are similarly charged. The labor is apportioned on the basis of a standard rate an hour.

Three daily records are kept, each of which is in

the form of a loose leaf sheet, which is kept in a hinder. The one is that of the vehicle, and this gives the number of miles driven and the cost of repairs for each day of the year, the monthly mileage and the repair charge being carried forward each month. At the close of any given day this record will show the daily items and the total for the year. On this record is earried the purchase price, and this is depreciated on a basis of 10 per cent. annually. Either side of the leaf carries a record for six months, and a summary.

The second record is of each battery, because batteries are changed from one whicle to the other, and while one battery might be in one machine for several months it may do service in a half-dozen or more during its period of usefulness. The record of each battery, like that of the vehicle, is by day, and mileage driven and the cost of repair is charged. It will be seen that a battery is regarded as having a certain approximate life, and it is expected that this will be realized by the exercise of good judgment.

The third record is of each tire, and a specimen page of this is shown. The three daily records are practically alike, aside from the headings, which are identified by the terms "vehicle," "battery" and "tire." The hattery and tire records show the purchase prices and when no longer useful the repair cost may be added. From this is deducted the estimated value for scrap. Then the length of time of service, and the number of miles driven or operated are entered, and the cost a mile is the final figure.

It will be noted that the vehicle mileage, the battery number, the individual tire numbers, and the total mileage for each, is taken from the report of the driver, which has been verified by the foreman. The requisitions for parts and supplies and time cards for labor supply the repair cost for each record. A further reord of the motor and hattery labor is kept, and by this it is possible to differentiate each character of cost.

Of course when a change of a tire or a hattery is made, this fact is noted in the report of the driver and the foreman, which makes it possible to follow the work accomplished with each.

The question may be asked: What is the value of this information? It will be seen that it is practical to ascertain whether or not the tires, hatteries or vehicles are giving the mileage expected of them, and to learn the reason for increased cost of any kind. To illustrate, the statement for the second year of service for the company showed the following:

Vehicle	Tire Cost	Battery Cost	Repairs Cost	Battery Co.
Capacity	a Mile	a Mile	a Mile	a Mile
1000 pounds.	\$ 0095	\$.0172	8.0147	\$.0016
2000 pounds.	0172	.0328	.6130	.00 89
4000 pounds.	0195	.0217	.0094	.0101

This was based on a mileage of 14,557 for the 1000pound wagon, a mileage of 14,269 for the 2000-pound wagon, and a mileage of 10,742 for the 4000-pound wagon. These figures reduced to a basis of 10 years' service showed that the cost was considerably less than had been estimated by the maker of the wagons, the General Vehicle Company, for average cost. The estimate of the General Vehicle Company is that the cost for tires, batteries and all replacement charge, without computing garage labor, is 22.17, 25.40 and 22.98 per cent, of the total operating expense for 1000, 2000 and 4000-pound wagous, respectively.

The showing of the Motor Delivery Company is the more creditable when it is understood that the General Vehicle estimate is based on 10,500 miles a year for 1000-pound wagons, 10,100 miles a year for 2000-pound wagons, and 9300 miles a year for 4000-pound wagons. It is understood that all things being equal the vehicle used the more ought to show a relatively greater repair expense, and with this company the machines show that the tire cost is decidedly low, especially when it is known that the machines are driven generally faster than the movement of the traffic, and over streets that are notoriously severe on rubber sloves.

The vehicles are not particularly striking so far as paint and varnish is concerned, because in daily service they show the effects of frequent washings and constant usage, yet they are amply protected from the weather and given good care. The best illustration of the attention given to them is by the reproduction of a report blank, which is filled in whenever an inspection is made. The nature of the examination is best understood by study of the form, for the inspector is required to not only investigate thoroughly all the mechanism, but to state facts relative to manner and frequency of lubricating, the condition of different parts, and after specifying in detail must suggest what will improve appearance.

Nothing whatever is neglected. The inspector goes through the controller, the steering gear, the motor, the axles and springs, the wheels, the countershaft, the brakes, the tires and the body, the only equipment not being reported upon being the battery, which is expected to be tested whenever necessary in the judgment of the foreman or the manager.

As might be assumed these inspection reports are filed and referred to as occasion demands, and they serve a particularly useful purpose in tracing any condition or defect. The records are systematically made and maintained, and they have been found to be of unusual value. When tire cost can be determined to a thousandth of a cent a mile; when the expense of the vehicle as a whole, or the batteries can be similarly accounted, it is both possible and practical to find every character of waste or leakage and to apply whatever is necessary or desirable to economize. There are certain fixed charges, such as amortization, interest, fire and liability insurance, electric power, rent, light, heat, water, taxes, garage labor, and driver's wages, which represent from 75 to 79 per cent, of the total cost of operation, which must be accounted for with other forms and by other methods, but these items are generally provided for with the majority of systems, and these cannot be regarded as within the scope of methods that have to do with the actual use, maintenance and care of the machines.

EXCLUSIVE ELECTRIC WAGON GARAGE.

New York Public Service Station That Produces Its Own Current by a Gas Plant and Gas Engines and Generators, Selling Its Surplus Energy at a Profit.

THERE are few service stations throughout the country devoted exclusively to electric vehicles, fewer still that give attention solely to power wagons of this type, and with but one or two exceptions these establishments depend upon the public service corporations for current for power, lighting and charging. One of the stations that produces its own electric energy is the Acme Electric Garage, at 410 East 32nd street, New York City.

There are more than 25,000 enterprises in the United States that produce current for light and power purposes, and each of these has a maximum production. As a business proposition each corporation seeks to sell all of the energy generated, because few of them have any means for conserving the current, and it canhave any means for conserving the current, and it canof electric vehicles is ordinarily fixed at a flat rate, a customary charge being four cents a kilowatt in cities of reasonable proportions. The garage will use whatever current is uecessary, and the demand may vary somewhat, the variance depending upon the service given by the machines.

There are numerous plants and buildings that have individual lighting installations, and some of them produce power, but practically all of these consume their own energy. Electric generators are not uncommon, and frequently these may be found in garages of even moderate capacities, but these are not often used for anything else than the lighting, although occasionally they may be utilized for furnishing power for the operation of small machine tools.



The Storage Space of the Acme Electric Garage, 410 East 32nd Street, Ven York City, with the Vehicles Out at Service.

not be profitably stored and used. Power requirements necessitate the operation of the plants by day and lighting demands a large part, if not a similar volume of current, for a portion of the night, so there are periods during the 24 hours when it is necessary to curtail production or waste what is produced.

Under any circumstances, no matter how closely the demand approaches the capacity of the generating station, there are times when the business requirements are comparatively small, such as from late in the evening until early in the morning, during Sundays, holidays, and other times when manufacturing plants are idle. Theoretically the greatest economy in production would be operation to capacity constantly, and whenever there is diminution of the use there is relatively an increase of cost for the interval, whatever it may be.

The usual custom is for the service station to purchase its power at the regular commercial rate, which is by a scale by which the price is lessened as the current consumed is increased, and the cost to the owners The Acune Electric Garage is notable from the fact that it is of considerable proportions and it generates all its own electrical power, using a gas producer plant to make fuel for the gas engines that drive the generators. The station serves approximately 60 service wagons, and this is all that can be accommodated with the floor space that is available. There are times when it is necessary to leave a few of the machines in the street to have space for shifting and locating the others, so that the station is really crowded beyond what might be regarded as the capacity.

Much is dependent upon the location of any business, especially a public station for power wagons, because of innumerable reasons, chief of which is convenience to the owners. Assumedly the nearer a garage is to prospective patrons the more probability of patronage, all else heing equal. It is rather surprising to find that the two exclusive electric service vehicle garages are both in the East Side of New York and within seven blocks of each other when the distance is measured as between streets.

That the station is given over wholly to electric service wagous is in itself a sufficient reason for the enterprise to receive special attention, and that all the current consumed is produced by the power plant is equally deserving of inquiry, but added to this is the gas producer that furnishes fuel for the motors, an equipment that has been found to be exceedingly economical.

The Acme Electric Garage was established three years ago last spring by William G. Hled, an electrical engineer who had a training in broadly differing works and with electric vehicles. He believed there were possibilities with a station of this character and after investigation opened a station at 37th street and Seventh avenue, where he sought to give a general service for industrial wagons. He solicited customers and secured a considerable number, though at that time the ratio of electrics in use was very much smaller than now.

Mr. Illch's plan for care and attention includes

was found to be a losing proposition because of the demands for current, and the belief of some customers that it was well to utilize the vehicles as much as possible where there was no difference to them in cost whether or not they consumed much or little current. Naturally the more the machines were worked the more energy was required.

After making the change of location Mr. Illch turned his attention to the current problem. He concluded that if he were to produce electrical energy at the greatest economy it would be necessary to find a sale for the energy available when it was not needed in the garage. This brought about investigation of conditions and a proposal to furnish lighting and power for the building in which the garage is established. The structure is devoted to manufacturing and power is needed to drive the machines and to operate the elevators, and while the lighting demands are practically the same as in any other manufacturing building, Mr.



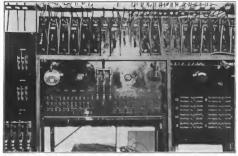
The Gas Producer, Gas Tank, Two 75 Horsepawer Gas Engines and Two Electric Generators That Produce 2000 Kilowatta Dally at a Cost Consumption of 2500 Pounds.

storage, oiling and greasing daily, washing, polishing, minor adjustments of the machines, flushing and equalizing the batteries, and supplying current. For this he established a fixed price instead of according to capacity and the real basis being the size of the batteries and the consumption of energy. Aside from this stated service the work performed was regarded as extra and charged for at the usual price for labor, with the additional cost of the parts or supplies used.

About a year later the garage was removed to the building in East 32nd street and this provided additional space for storage. The entire ground floor is occupied and there is an area of approximately 20,000 square feet. A small part of this is utilized for an office, and the remainder is open and clear, several sections being given over to mechanical and battery work and the gas producer and power plant.

The first year Mr. Illeh made contract with his customers on a basis of \$30 a month for service, but this Illch found he could supply the building and its tenants, provided he could have a thoroughly dependable service, and that this would require a plant of considerable proportions. As this current would be necessary during working hours six days a week and there would be some slight demands during Sundays and holidays, and his garage requirements would be principally during the nights of the working days of the year, he made his estimates and then visited engine builders and submitted to them his proposition.

The result was the ordering of a mechanical plant that cost approximately \$8,000 installed, this including a gas producer, two 75 horsepower engines, and two electric current generators. This was installed in a corner of the garage, and it was first placed in operation April 1, 1911. The purpose was to make the plant as well nigh automatic as is possible, and it is said by Mr. Illch that the attention necessary is given daily in about two hours by a single man, so that the labor



A Section of the Charging Board of the Arme Electric Garage, Which Has a Capacity for 24 Machines at Once.

expense is practically negligible. The plant produces about 2000 kilowatts each 24 hours at cost of .2 cent a kilowatt for oil and fuel, and the other expenses bring the total cost for production up to .8 cent a kilowatt.

The plant consists of a retort into which the No. 1 buckwheat coal is fed automatically by gravity. The gas generated is purified and carried to a tank where it is cooled and utilized to energize the motors. The engines were built by the Bruss-MeBeth Fagine Company, Cleveland, O., these being a heavy duty type, water-cooled, four-stroke cycle, having four cylinders each with 11-inch bore and 12-inch stroke, developing 75 horsepower at 310 revolutions a minute. Each en

gine is fitted with two magnetos to insure against ignition failure and coupled to each engine is a generator. The engines are started by compressed air. Each engine is operated 23 hours daily, one being stopped for an hour between 6 and 7 the evening of each day, and the other between the same hours in the morning, during which stoppage they are given whatever attention is necessary.

The other hours both are in operation, and are ordinarily driven to capacity. The coal consumption is 2500 p ou n d s daily, the cost being \$4.50 a ton delivered at the garage. Being well silenced there is practically no noise and the engines, when the gas supply and the ignition have been adjust-

ed, will continue work for indefinite periods. The plant is not small, and yet from the accompanying illustration it will be seen that it is compactly installed. The heat from the producer is not excessive.

The results with the gas producer and the power plant have been so satisfactory that Mr. Illch intends to add another 75 horsepower motor and generator to the installation, which will nake the third unit and will afford 225 horsepower when all three are in operation, the demands for current being such as to justify this increase of capacity.

The garage is conducted as a service station for contract customers, practically all of the

business being attention to vehicles that are served on a monthly basis. The established rate for each vehicle of the following capacities is as follows:

Load :	Capacity															۲	١,,	r	·	Ice		
750	pounds.																			. 1	623	à
1,800	pounds.																				41	1
2,000	pounds.																				4.	
3,000	pounds.																				4	ŝ.
4,000	pounds.																				50	į,
6,800	pounds.																				20	
7,000	pounds.																				31	
10,000	pounds.																				53	۵

For the prices stated the vehicles are stored, washed and polished daily, oiled and greased daily, whatever adjustments are necessary are made daily, the batteries flushed and equalized whenever this work



The Battery Repairing Department of the Aeme Electric Garage, Showing the Stock of Materials and Facilities for Work.

Nº 400	SHOP TICKET	
	ELECTRIC GAR	AGE
BATTERY	NEW YORK.	191
Work to be dane or		
To be completed		
Time and Material us	ed	
Bamarks		

Shop Ticket of the Acme Electric Garage, Padded for Triplicate Entries, of White, Yellaw and Plak Paper, 5.23 Inches Length and Eight Width, Perforated for Separation from the Pad.

is desirable. As the machines are generally in use during the day the greater part of the work is performed at night and during days when they are not worked, so that the majority of the employces are included in the night shift, which is directed by the night foreman,

The machines are taken out at different hours in the morning, some of them very early, and usually they are returned in about the order in which they leave. They are occasionally left just outside the garage because of the limited floor space and are brought in and washed, after which they are placed in their different bays and immediately placed on charge. Each car is given a hasty inspection as it is brought into the garage, its general operation being noted in the handling and examination being made of any conditions to which attention is directed. The drivers are required to make report of whatever in their judgment is needed to maintain efficiency or any adjustment that is necessary.

When a vehicle is washed and placed on charge necessary work is begun. Occasionally the washers may discover the need of an adjustment or repair, and report is made to the foreman. If the condition requires work in addition to the regular attention this is ordered under the instruction or authority of the driver or owner, a record of which is made. Some owners authorize their drivers to order work, some reserve this right to themselves, and others give discretionary authority to the management of the garage or the foremen. As a rule considerable depends upon the requirements to keep the machines in operation, and an emergency work may be ordered without authorization if the service could be uninterrupted. Or perhaps a temporary repair is made and the driver or owner notified as soon as they can be conveniently reached. As might be assumed there are many situations that cannot be forecasted and where exercise of judgment is imperative. Of course it is essential that there be no loss of service, for the garage management is responsible for the condition of the ychicles.

Each month, or rather at intervals of approximately 30 days, careful inspections of the machines are made and detailed reports prepared that are sent to the owners. These reports are the basis for statements as to the cost of parts and estimates of the probable labor needed and cover everything up to a general overhaul or a latterty renewal. One of the most important details is the condition of the batteries, and these are equalized once a month as an average, and are flushed whenever experience justifies this attention. The batteries are attended by an electrician of expert knowledge with them, and repair work of all kinds is undertaken. Several of the machines are used with spare batteries and practically all the time battery work is in progress.

With relation to the repairing and restoration, when spares are required it is expected that the owner will have at his disposal such parts as may be from time to time required, because it is desirable to order these and have them in readiness rather than take the chance of having the machines idle in the event of need. So far as possible stock is carried with which service may be maintained until a factory order may be filled and restoration made. This applies to vehicle, motor, controller and battery components. The repair department is equipped with tools sufficient for any reasonable number of workers, but special work may be procured outside rather than installing machine tools for which there is but occasional use.

The regular attendance to each vehicle is shown by the charging sheet, so far as current supplied is concerned. The report of the driver to the foreman, the brief test, the examination by the washer, and the washing, is followed by the charging, and if the work

Vo	***********				AC		ELEC argir			RAGI †				191
Vehicle	Be	ttery	Mas a	Opes Cored	Plug	Begin	ning of C	harge	En	d of Char	ge	Aed	Ode-	Remarks
Venicie	Cello	Plane	Amp :	Valle	No	Time	Amp's	Value	Tow	Amp's	Value	Read's	Reed's	rvemarks
	-	-												
	+				\sqcup	_		-					=	_

in the way of adjustment is included within the contract no record of it is made. If there is a part or supply used the extra work is included in the shop ticket made out for the job. The shop ticket is self-explanatory. It specifies either mechanical or battery work, the identity of the machine, when the work is to be completed, and the material used. The ticket is made out and on it is written whatever direction or comment is desirable. The ticket is signed by the authority for the order.

This shop ticket is made in triplicate, the white sheet being the original. the yellow and pink sheets being the first and second copies, respectively. The original is given by the foreman to the mechanic who will do the work. This ticket is the authority for the requisitions for the material and supplies for the job and these requisitions are charged by ticket number and to the name of the owner of the vehicle. The first copy is placed on a hook on the desk of the bhookkeeper and serves as a means for checking the original and the requisitions. The second copy is used as a record



Detroit 1000-Pound Electric Delivery Wagon in the Service of the Croalager Packing Company, Shamokin, Penn. and is sent with the bill to the owner. The labor is indicated by the time card and the total is charged on

the original at the completion of the work,

Where the work is of a character to require a number of items of materials and supplies these are made out in list form and attached to the shop ticket, which in its general form is a summary. Obviously these tickets may be applied to practically everything that is undertaken in the garage, and, from them, when supplemented by the requisitions and time cards, every detail is cared for.

The charging record is more detailed than the usual form, this requiring the vehicle by number or other identification, the number of cells and number of plates to each cell of the battery, the maximum charging amperage, the open circuit voltage, the number of the charging plug, the time, the amperage and the voltage at the beginning and closing of the charge, the acid reading, the odometer reading and remarks, if any. It will be seen that to fill the report requires a

knowledge of facts that can only be learned by actual examination, and there is no chance for an error to go undetected. The station has 36 charging plugs.

Of the electric wagons in use the majority of them are intended for heavy service, about 30 per cent. of the total being designated as small. Several of the trucks, three 3.5-ton machines to be specific, are cared for at the garage under a regular maintenance contract, which provides for every attention, including repair work of all kinds, tires, painting, and the like. With these it is necessary to keep a record that would be similar to what would be employed by an owner, in addition to the usual contract accounting. The success of this form of contract has not been sufficiently determined to justify a statement on the prices charged for each vehicle.

The character of the garage and the generating plant attracts many visitors daily, and the installation is frequently examined by electrical engineers.

PACKING HOUSE ELECTRIC DELIVERY.

For more than a year the Croninger Packing Company at Shamokin, Penn., has used a 1000-pound Detroit electric delivery wagon, made by the Anderson Electric Car Company, Detroit, Mich., in its service with decided success. The work is haulage to and from the railroad freight stations, as well as delivering a considerable volume of orders. This machine is a standard type with a water proof fabric cover that gives protection to the load and sufficiently shelters the driver, having also the merit of lightness. The company regards the electric as ideal for the work this wagon has to do because of the cleanliness and absence of odors that might contaminate the meats carried. This wagon is equipped with a 60 type A-6 cells Edison battery. The current is supplied from a generator operated at the company's plant and the cost of energy is comparatively low. When the wagon was placed in service the driver was selected from men who had long been in the employ of the company and he carefully maintains it. The wagon accomplishes a very large volume of work and has always been found dependable and economical.

TESTING ELECTRIC TRUCKS.

Speaking of the testing of electric trucks, J. M. Lansden, manager of the electrical division of the General Motors Truck Company, Detroit, lays elaim to the fact that the task is no easy matter. After the truck is assembled it is given its preliminary road test. This is done for the purpose of noticing the relationship of one part to annother, and to see if the truck runs smoothly and is otherwise correct mechanically. After this comes the most important trial, that of ascertaining the power capacity. To make sure of this the General Motors Truck Company overloads each truck 50 per cent, and with this extra weight the truck rough the product of the second of the se

VEHICLE TRANSPORTATION RESEARCH.

THE first investigation of highway transportation by an educational institution with a view to determining economic possibilities is now progressing under the direction of the electrical engineering department of the Massachusetts Institute of Technology at Boston, and the direct supervision of Prof. Harold Pender. Much of the investigating for the past year has been by H. F. Thompson of the department, and information has been obtained in Boston, Buffalo, Chicago, Dayton, O.; New York City and Rochester, N. Y.; St. Louis, Mo.; Washington, D. C.; Pittsfield, Mass., and other cities. The first comparative information resultant from the compilation of the data gathered has been presented in a preliminary report, which is designated as Vehicle Research Bulletin No. 1.

The systematic study of the work accomplished and the cost of maintenance of horse, electric and gasoline wagons was made possible through a fund placed at the disposal of the institution by the Edison Electric Hluminating Company of Boston, and, with a realization of the value of the reports to the industrial and commercial world, the investigation was organized as carefully as was possible without precise knowledge of what might be developed by inquiry.

The first statement made is decidedly worth the attention of every man engaged in business, no matter what his need of haulage. It is necessarily brief, its findings are incomplete, and there is absence of facts that might accentuate the determinations, but even a casual examination of the report deeply impresses upon the reader the absolute necessity of systematic and perfected accounting of transportation expense. As a matter of fact, it would appear that there are unlimited possibilities for systematizing haulage to bring about the fullest measure of economics, and the Massachusetts Institute of Technology through its research of vehicular transportation has inaugurated an education that is absolutely necessary, and which until now has been neglected.

Like every inquiry having economy as its purpose the work has progressed slowly. This has been due to the inability to obtain anything like uniform data from the concerns willing to supply whatever information was possessed, and only from 11 of the 54 individuals and corporations covered by the report were facts forthcoming. Of the remaining 43 concerns, 21 promised to furnish data later on, and from 15 others no facts were obtainable. The bulletin deals with these 11 instances and with the observations making with the vehicles of nine different firms in Boston.

Emphasis is made of the difficulty of securing anything like reliable facts, and it is to be further commented that there is the widest difference in those that have been obtained. This condition obviates the direct comparisons that are really essential to precise determinations, and this brings directly to the attention of the business man the imperative need of uniformity in accounting. It is hardly necessary to expatiate upon the value of comparisons. Today the measure of service and cost is by animal transportation, two factors that are so uncertain as to be worthless, and are so variable as to be untrustworthy unless the standard is the usual market price for rented service, an exceedingly unreliable basis.

In making the investigation forms have been prepared which appear to be well suited to the requirements, and detail in the form of figures is supplied sofar as this may be done. In the report these figures are submitted in the form of summaries. Some of these, however, deal with the same type of vehicles in the service of the same organization, yet these are for differing services and must be further analyzed before the relative expense and work can be understood, even on a monthly basis. The summaries for the electric and gasoline machines are as nearly alike as is possible to have them. The majority of the wagons is electric, and it is apparent that the owners of that form of vehicle have given more careful and systematic attention to their service accounting than those owning other forms.

The electric summary gives the capacity of the vehicle, the number of the company, the business, service, period of data, number of trucks averaged, truck cost, truck age, company's number and type of battery, under the head of general; the number of miles, kilowatt-hours, days used, days out of commission, trips, stops and weight of loads are under the heading of annual performance; and under the head of animal expense are three groups, the first of which includes running repairs, lubricants, electricity, garage, sundries and drivers as the operation division; battery, tires, overhaul and painting as the maintenance division, and amortization, administration, interest, insurance and taxes as fixed charges. In the forms for the gasoline trucks gasoline is substituted for kilowatt-hours under the heading of performance and gasoline replaces the item for electricity in the operation group, while the battery item is omitted from the maintenance division

In the report on animal service the general heading includes rating (number of animals used), number
of the company, business, service, period of data, number of units averaged, ratio of horses to wagons and
value of investment; the heading of annual performance includes the number of miles, days each horse
worked, days each horse was unable to work, the trips,
stops and weight of loads; the annual expense is included in two groups, the first of which is made up of
operating cost, including shocing, veterinary, feed,
stable, repairs, sundries and driver; and the fixed
charges are amortization, administration, interest, insurance and taxes.

There are 36 different summaries for electric vehicles, 10 for gasoline trucks and 12 for horses, a total of 37 examples. It is a fact that in no instance has the summary been filled out as desired, there being from two or three to practically all the items omitted, and in some cases the annual expense is given as a single

The methods of the investigation are not criticised. but the insufficiency of the information is pointed out to illustrate how indifferent concerns have been to the expense of haulage, and to emphasize that it is only by the continuance of the inquiry and the widest publicity to the reports that there will be realization of the economies that are possible. As this is the first time that the importance of the work has been brought to the attention of the public, and there is no reason why the information should not be of general benefit, it is evident that the general character of the results is dependent upon the attitude of the business men approached. As the identity of the firms are not known and it would be practically an impossibility to connect any concern with the facts contained in the reports, there should be no reason for diffidence or withholding information that will be so useful and beneficial.

Perhaps one of the most frequent reasons stated for lack of facts is that the company has been "too busy to obtain them." This is a strangely inconsistent statement to come from a concern that will figure its manufacturing cost and its selling and advertising expense to a thousandth of a cent, and yet such firms will ask to be shown information directly concerning their haulage that they have not regarded as of sufficient importance to ascertain from their own records.

It is best to make clear that the research work will improve in the ratio that exact information is supplied. Its value will be to the people as a whole what they make it, and it is certain enough to secure what will benefit one it will be necessary to undertake an accounting of a delivery service that the research data can be utilized. To illustrate, all the system or organization method that may be devised is absolutely valueless to any person unless it is employed, and to have value it must be measured by results obtained previous to its adoption. Only by such comparisons can its worth be determined, and no facts or information that may be gathered will be beneficial unless uses are made of them.

It is not to be assumed that summaries of the character briefly presented in the research bulletin will be sufficient, because there are innumerable essential details that are perhaps peculiar to each concern that must be considered. For instance, the general business of the firm must be known to the extent defining the character of its haulage, the topography of the city where it is doing business, the nature and proportions of its equipment, the method of maintenance, the tonnage hauled and the conditions under which the freight is unloaded and loaded, the facilities for handling the freight at either end of the hauls, the manner in which the delivery routes are made up and covered, the overhead expense, the cost of labor, the facilities for repairing, the quality of maintenance, the class of paving or roads on which the vehicles are driven, the speed permitted, whether or not overloading is permitted, and the mechanical capacity of the driver or those having charge or supervision, provided that the service is of motor vehicles, must be stated. If electric machines, the cost for electricity, the facilities for charging, whether stored in a public or private garage, and perhaps other data are essential. If animals are used the number of horses rented is a factor of importance, and the influence of organized labor upon wages and service is a desirable fact.

It is understood that conditions differ materially, and there are so many factors to be considered that it is not possible to average results, which brings the comparisons down to each form of service as employed by the same concern.

But with all this the main problem that must be solved is how can the delivery with motor vehicles be arranged to obtain the fullest benefits of the increased speed, and how it is practical to utilize all of the time that is possible in actual haulage and minimize the loading and unloading. An example of this may be cited in which a large firm employing a motor truck in its delivery sent large loads of its goods to a point about 25 miles distant, and worked the machine to what might be regarded as the maximum speed that it should be driven, but required the driver to spend an hour loading and another hour unloading, so that while the man was exceedingly busy the truck was idle for practically a third of the time it was engaged in what ought to have been its most productive work. These same methods were the vogue with all delivery made by the truck, simply because they were those employed with horse vehicles. The saving of time by unloading and loading to a system, by traversing specified routes, by avoiding congested traffic, by many possible economies, had not been realized. Perhaps these possibilities had not been considered.

This case in point is stated to emphasize that the summaried figures of this firm's annual work and operation alone would be practically worthless as a measure for the determination of the performance of other deliveries, because it had been apparently assumed that the possession of the truck was a saving and no attempt had been made to secure its largest productiveness. In other words, unless the fullest details are stated it is impossible for practical results to be obtained from the summarized statements. Tonnage carried at a stated cost means nothing unless qualified. because the conditions in which the work is performed may have necessitated abnormal expense, or they may have been exceedingly favorable. Maintenance and upkeep are never uniform, and in the one case may be at minimum through careful attention, or maximum from carelessness and neglect. Again the tire mileage may be large or small, according to the judgment and care of the driver.

Perhaps the better way of stating the unsatisfactory nature of two series of figures as applied to haulage, without analysis of the facts of the work, is to say that without knowledge of administration, and unless the service is absolutely identical, these may be in every way misleading, no matter how conscientiously they may have been compiled.

The summaries, however, do not by any means indicate the thoroughness of the investigation as made by the department, and it is expected that in later bulletins much material information will be included that is now covered in a statement of the scope of the work. It is made clear that this report is preliminary from every point of view and that there is realization of the extremely wide variance of service; that the type of vehicle best suited to a particular class of service will depend generally upon the nature of that service; that a complete understanding of the character of the service to be performed, as well as a thorough knowledge of how each element of service affects the cost of operation of each type of vehicle, is essential before a decision can be reached as to the relative economy of the three types of vehicles (animal, gasoline and electric wagons.)

For this reason the investigation is pursued along two lines, the one of which is the determination of the demands of the various kinds of service, and the study of the relative economy of the three types of wagons when used in any given service. The subject of loading and unloading, as determined from the average mileage a vehicle may be driven in a day, and the standing time (when the vehicle is idle) is given extremely careful study. The average distance a vehicle may be driven a day under ordinary conditions, assuming no obstruction from traffic, is termed the distance capacity, and the ratio of actual miles a vehicle is driven to the number of miles it may be driven is regarded as the distance factor of the machine. The greater the distance factor the less will be the cost a unit of the service, and the natural conclusion is that every effort should be made to increase the distance factor. It is pointed out that to insure the largest distance factor may necessitate material changes in a service when motor vehicles are substituted for animal wagons, and that data are being collected with a view of determining where modifications can be made to increase the distance factor of such service.

The report further emphasizes that in most cases the period covered by the report for the maintenance charge is not long enough to be representative of the average throughout the life of the machine, this being particularly true of the gasoline trucks, because comparatively few were marketed prior to two years since. Also, that the total only includes the items which the various companies charge against their trucks; that these items of cost actually exist, no matter whether or not they are omitted from the accounting, and it is decidedly emphasized that many users of motor and horse drawn vehicles are misleading themselves as to the total expense of operating their deliveries, because of neglecting many of the contributory items.

Statement is made that performance records are extremely meagre, especially with horse wagons; that the relative cost of performing a given service by means of the three types of vehicles, however, depends to a very marked degree upon the nature of this service, particularly upon the loading and unloading conditions and the limitations of speed due to the traffic conditions of the streets. To obtain accurate data the institute has installed upon a number of wagons and trucks recorders that record on tape the stops and movements of each, the indications being of time and speed and distance travelled. Nine different concerns are now, or will shortly, furnish the department with these daily records. When the report was compiled 45 tapes were received daily, and it was expected to increase this number to 70, these representing work in city pick-up, furniture moving, freight handling, baggage transfer, wholesale and retail coal delivery, parcel delivery, bottled goods delivery, installation and maintenance service of an electric light company, and miscellaneous haulage. The types of vehicles range from one to three-horse teams and from 700 to 10,000pound trucks.

It is stated that when the study has extended over a number of months it is anticipated that it will be possible to arrive at definite conclusions regarding the demands of the various classes of service. Without definite knowledge as to the average running speeds, the time required for loading and unloading, the time a vehicle is moving with and without load, the number of stops a mile, etc., it is impossible to predetermine the cost of performing a given service.

The institute is observing the vehicles visiting the in-bound and out-bound freight terminals of the three railroads centring at Boston, the observations including the average time taken for the several types of wagons at definite daily periods, covering entering, backing, loading and unloading, exit and delays. As the distances from these freight houses to the Boston wholesale district are comparatively short the length of delays is expected to have important bearing upon the work performed by any vehicle.

In addition the institute is conducting tests concerning the energy consumption of electric trucks when operated over different kinds of paving in Boston, with specific reference to the effect on energy consumption of non-skidding devices, which experiments will be continued with broader scope. Besides this, the investigation is being directed toward the collation of battery life and tire endurance data. Obviously considerable time must elapse before dependable facts may be made public.

PACKARDS FOR EXPRESS COMPANY.

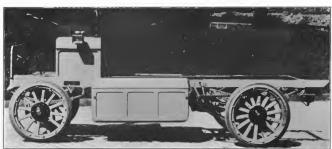
The American Express Company recently placed in commission at Gloucester, Mass, two three-ton Packard tracks, made by the Packard Motor Car Company, Detroit. These vehicles will do the work formerly handled by several horse drawn vehicles, and the plan is in line with a policy adopted only a short time ago by the same company in Rockport, Mass, and Manchester, N. H.

ATLANTIC ELECTRIC TRUCKS.

ELECTRIC service wagons, with capacities of one, two, 3.5 and five tons are produced by the Atlantic Vehicle Company, an organization with general offices at 1600 Broadway. New York, N. Y., and a factory at Newark, N. J., these being built to designs by Arthur J. Slade, who has for seven years given his attention to motor truck engineering and study of transportation problems. It is claimed for the Atlantic machines that they represent the most advanced practise and, as the electric vehicle has passed the period of experimentation, they can be guaranteed in every respect as to design, material, workmanship and service.

The company engaged in the industry after careful investigation of the possibilities of electric motor wagons, the determinations being based on extended observation of the work practical with such vehicles the two-ton wagon is taken as a subject. The design is what is known as the "low-seat" type, in which the seat and footboard are not incorporated with the body, but are located on the chassis frame, the space taken np varying from about 33 per cent. in the ton wagon to about 24 in the five-ton vehicle. The variance is from the fact that there is no greater requirement for the larger machine than for the small, while the loading space is proportionately increased with the greater capacity.

The wheelbase lengths of the wagons are respectively 102, 114, 135 and 144 inches in the order of capacity, and the purpose of the designer has been to carry about a third of the load on the forward wheels and approximately two-thirds on the rear wheels. It is believed that this weight distribution will afford the greatest ease in steering and control and sufficient



The Minnie Electric Truck Chassis of Two Tons Capacity, Bullt by the Minnie Vehicle Company, Newark, N. J.

and the needs to insure the greatest economy of haulage. The machines produced were not offered in the market until every detail had been worked out to the satisfaction of the engineering department, and it was believed that the production would compare favorably from every angle with all other standard vehicles of similar type.

The factory is completely equipped with machine tools and facilities for building the wagons and in connection with it is maintained a service department which is available at all times to Atlantic truck owners for aid in operation and maintenance of the machines. The company is thoroughly organized in every respect to construct, market and care for its vehicles, and it is prepared to produce whatever is desired within the range of canactics stated.

The Atlantic electric wagons are of one design, though of differing sizes, and a description of any one will serve as well as of all, it being understood, of course, that dimensions are varied. In this justance

traction at the rear wheels at the same time.

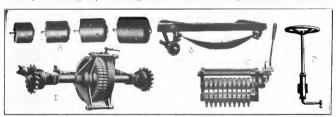
In the Atlantic trucks many of the components are the standardized productions of the best known and most dependable manufacturers. For instance, the motors are built by the General Electric Company, as are the controllers, while the front and rear axles, including the brake shoes and brake drums, are Timken products. The reason for the use of products of this character is that it is believed that as they are made by concerns of recognized reputation, are the results of long and well founded manufacturing experience. are made to correct designs from carefully selected materials, have been developed by experts with a view to the commercial possibilities, they are in every way reliable. Not only this, but parts may be secured in the open market, ordered from the manufacturers or their branches with a certainty of having a standard quality and being of absolutely precise proportions. In addition there is an economy in maintenance that is to be considered by the purchaser,

The general design of the chassis includes a single motor of sufficient capacity which drives through a countershaft through a double chain reduction to the rear wheels, the energy being furnished by a battery carried in a stoutly constructed box suspended from the chassis frame between the countershaft and the rear shackles of the forward springs. The battery may be of any standard make from any type suited to the vehicles that the purchaser may care to use.

The motor is enclosed in a pressed steel housing or shell and a section of the case at the commutator end is hinged so that it may be lifted to examine or clean the commutator, lubricate the hearings, etc. This cover is closed securely by a clamp and then the motor is protected against dust, water and mud, or any substance that might cause deterioration. The design is intended to save weight, occupy minimum space, and give couldring construction at molerate price. The high rotative speed is expected to yield correspondingly high electrical efficiency, conserving the battery and increasing the possible mitage, while

new the grease from time to time. The interior of the case may be examined easily when desired.

The design of the jackshaft is such that it may be removed as a unit from the chassis and similarly restored. The jackshaft housing is composed of two east steel end members that are formed to be bolted to the hangers at their inner ends, and the outer ends carry the large annular ball bearings. To these members are attached the forward ends of the radius rods. Into these members are brazed the outer ends of the Shelby steel tubes of the housing, and the inner ends of the tubes are brazed into large malleable iron spiders that are bolted together and surround the differential gears and the chain sprocket. These spiders also support the chain case, which serves as a diffential housing as well. The differential assembly is a beyel gear and pinion type, with the gears of 3.5 per cent, heat treated nickel steel, and on the cage or housing is mounted the chain sprocket, beside it being the contracting band transmission brake. The differential is carried on large annular ball bearings and the



Components of the Atlantic Electric Trucks: A, the Motors for the One, Two, 3.5 and Five-Ton Machines; B, Jackshaft Hanges and Bear Spring Suspension; C, Controller; D, Steering Column and Genry E, Jackshaft Assembly.

mounting the motor high protects it from road obstructions and probable damage.

The motors are of the four-pole type, series wound, and operate at 85 volts, which is regarded as being the most advantageous potential when used with lead batteries, and liberal electrical factors make possible their use with high overloads for considerable periods of time without deteriorating results. The commutators are of small size and the high grade carbon brushes of large area insure the perfect commutation required when used with storage batteries. The friction loss is minimized by employing ball bearings for the armature shaft. These motors are constructed to endure 300 per cent. overloads, which affords comparatively high power when it is needed. The motors are suspended from a stont frame cross member by hangers bolted to the shells. The pinion or sprocket of the armature shaft is connected with the countershaft gear by a Morse silent chain that is enclosed in a case, this case being solidly secured to the motor shell and to the countershaft, and when packed with lubricant it needs but little attention other than to reshafts are of 3.5 per cent, heat treated nickel steel,

The jackshaft assembly is suspended in erucible steel cast hangers that are formed to carry the shackles of the forward ends of the rear springs. These hangers are of large size and are hot riveted to the chassis frame. By the removal of the retaining boths the jackshaft may be dropped from the hangers in a comparatively brief time. The outer ends of the driving shafts carry the east steel driving sprockets and from these the chains extend to the east steel sprockets that are bolted to the rear wheels.

This description will indicate that the moving parts of the chassis, aside from the wheels and steering gear, and brake, are comparatively few.

The controller is selected with reference to the motor and, being a product of the same maker, ought to yield equally good results. This controller is of the continuous torque type, a design that eliminates the objectionable joits caused by the opening of the circuit when passing from series-multiple to multiple connection of the field coils, which adds considerably to the life of heavy vehicles. With the single motor series-parallel arrangement of the field is the standard form of control, and resistance is used on the intermediate steps, the controller having a sufficient number of notches to safeguard the chains and gearing of the transmission. The controller is of the drum form, operated by a pinion and sector at one end. The sector is mounted on a countershaft carrying the operating handle, which is made of drop forged steel. The controller is mounted under the driver's seat and the handle is at the left side. It affords four forward speeds and two speeds in reverse. The contact fingers are liberal, in cross section area of contact and should endure for a long period, while they are extremely accessible in the event of renewal being needed.

The chassis frame is of structural steel channel section four inches width, and weighs 5.25 pounds to the running foot. It is constructed with sturdy cross members and all the joints and gusset plates are hot riveted. The spring hangers are of liberal size and are steel castings with bushings and self-lubricating bolts. It will be understood that wear at these points is minimized and renewals may be made with a comparatively small expense. The springs are of ample length and width and are of Krupp silico-manganese steel. The design is a comparatively large number of finely tempered plates and the purpose is to so combine strength and flexibility as to minimize vibration and road shock, and at the same time fully protect the chassis frame and the load. The springs are semielliptical, with a minimum of camber, and the eyes are fitted with bronze bushings and self-lubricating bolts, hardened and ground. The rear ends of the forward springs and both ends of the rear springs are shackled and the movement of the chassis frame and body is fully compensated.

The front axle is a heavy I-section of high quality drop forged steel, with the large yokes designed for hard service, and the pivots and wheel spindles fitted with Timken roller bearings. The rear axles are rectangular, of the same material, and are equipped with similar bearings. The wheels are built to special design and the spokes are rectangular in cross section, having ample support at the hubs and being flared at the outer ends with the larger sizes. The felloes are wood and are held by heavy steel bands shunk on. The wheels are built to the S. A. E. standard and will take all standardized tires. The wheels of the smaller types are 34 inches diameter front and 36 inches diameter rear, and with the larger sizes 36 inches diameter front and 40 inches diam

The steering gear is placed at the left side of the chassis. It is of an irreversible worm type with an unusually large contact surface and for this reason the wear is very slow. The gear is mounted in a bracket supported by the chassis frame and at an angle convenient to the driver and it is turned by an 18-inch hand wheel. There are two sets of brakes, both operated by pedals. The one is external contracting on a drum on the jackshaft, and the other is internal expanding within large drums mounted on the rear

wheels. The jackshaft brake drum is cast integral with the jackshaft sprocket and the band is lined with an anti-friction material. The shoes of the wheel brake are faced with a similar material and these operated against the pressed steel drums. The radius rods are of cast steel and at the rear ends are bushed with bronze to resist wear. These rods are adjustable at the forward ends.

All wearing parts of the chassis are provided with compression grease cups of sufficient proportions. All the forgings, including the brake levers, pull rods, brake shafts, are of manganess steel, carefully heat treated to afford maximum strength. The battery boxes or cradles are constructed with floor, sides and ends of wood carried in a stout angle iron frame, from which the battery crates may be removed or installed at either side. These are proportioned for the requirements of the vehicles.

All chassis are provided with dashboards, footboards, driver's seat boxes, (in which the controllers are mounted and tool spaces are provided) Sangamo ampere meters, main circuit switches, charging receptacles, tail lamps, two side lamps, electric bells and set of tools. The bodies are built only to specifications, and while the company is prepared to furnish whatever a customer may desire, this equipment is not considered with the chassis, nor included in the prices quoted.

ELECTRIC TRUCKS MULTIPLYING.

That the electric wagon is recognized by business men as having qualities that make for extreme endurance and economy is especially noticeable in the cities of considerable proportions, especially in Boston, where the purchasers require long and careful demonstration of capacity and expense. The Bostonians have this season adopted electrics in numbers surprising to the observers, and the orders from New England for General Vehicle wagons are averaging two and three a week. The number of machines in Boston alone may be understood from the fact that there was more than 50, some of them highly decorated, in the annual parade of the Joseph Warren Association in that city July 4, while in the Memorial Day procession there were 153. Nothing could more thoroughly demonstrate the fact that electric wagons and trucks are in use.

The perfection of the machines in the last few years by the use of lighter and better materials, the utilization of the single motor, the decreased weight and greater mileage of the battery, are some of the reasons, to say nothing of the special production of electric energy by the lighting and power companies. Not only this, but by the exchange of batteries it is possible and practical to keep a wagon working as constantly as could be desired.

G. V. COMPANY TO BUILD MERCEDES TRUCKS.

PRESIDENT P. D. Wagoner of the General Vehicle Company, Long Island City, N. Y., makes the following statement relative to the acquisition by his company of the American right to manufacture and sell the Mercedes gasoline truck, built in Europe by the Daimler Motoren Geselbschraft, in response to a very general request for information from the trade and those concerned in highway transportation throughout the country:

'As the largest builders of electric commercial vehicles in the world, the General Vehicle Company has had an opportunity in its 12 years' experience of studying deeply, not only problems of truck manufacturing and vending, but of service adaptability as well. The wide distribution of its product has shown that well built electric trucks can care for from 80 to 85 per cent. of all average urban trucking and delivery. That is, in relatively short hanl work, especially where stops are necessary, the electric is the most economical as well as the most dependable commercial vehicle. For longer haul cross country work, where higher speed and greater radius of action are essential, the gasoline truck is unquestionably superior. The General Vehicle Company, while recognizing this situation in the past, held strictly to the electric field and where the service conditions warranted it, cheerfully recommended gasoline trucks to its own customers,

"Financial strength and the ability to supply a complete commercial vehicle equipment for any line of business have now become two of the requisites necessary to the successful manufacture of motor trucks. We have ample capital and the development of the art has reached a point where it has seemed wise for the General Vehicle Company to be in a position to supply purchasers requiring long and short hand service with their entire motor truck equipment, particularly as many of them, after using G. V. trucks for years, have made this suggestion. Many of its customers seemed disposed to realize the advantage to them of dealing with one large, strong manufacturer, rather than with several.

"In studying the problem, investigation revealed the fact that a large number of American made long distance trucks seem to have been designed for city rather than cross country service. Instead of being constructed for years of hard work under variable conditions, they seemed designed more to compete in the sphere of the electric, which is not, and cannot be the sphere of the gasoline machine.

"After thoroughly analyzing the situation in America, I turned to Europe in our search for the ideal, spending three months in continuously studying Enropean conditions and designs, accompanied by our factory manager and our engineer. We investigated all motor trucks of European manufacture, and interviewed hundreds of users. Our investigation developed the fact that while there were good trucks in England, France and Germany, giving good results

under their conditions of road operation, there was only one truck which was unquestionably fitted for service under American conditions, namely the Mercedes. We were surprised to find that not only was this truck giving excellent results over a long period of years where road conditions were favorable for heavy haulage, but in certain mountainous and rural districts where we found road conditions fully as unfavorable as we have here, this truck was giving from six to 10 and even 12 years exceptional service. Its record in cross country work compared very favorably with shorter hauls on perfect roads. This was a revelation, and our investigation convinced us that the Mercedes was the best truck in the world for long haul work in America.

"After considerable difficulty we succeeded in securing the right to import German manufactured Mercedes, commercial

vehicles and the exclusive manufacturing rights for the same in the United States, This places the General Vehicle Company in the enviable position of offering the public the oldest and best electric truck in the world. and the oldest and best gasoline truck. The American built Mercedes truck will be a replica of that of German



manufacture and p. p. Wagoner. President, tieneral will be manufactured Vehicle Company.

tured from the original drawings of the Daimler Motoren Gesellschrait, which will also furnish material, tools, jigs and fixtures.

"Pending the completion of manufacturing arrangements we will import Mercedes trucks to supply immediate demand and we feel confident that the patronage which we have long enjoyed for our electric trucks will be extended to the new line.

"The electric truck and the gasoline truck each has its particular field and the General Vehicle Company is now prepared to cover the entire field of commercial vehicle service. It will continue its past practise of recommending and selling the proper vehicles for each class of service."

The Eisner-Lenk Company was incorporated recently in Boston for \$50,000. It is planned to manufacture a line of commercial cars. The incorporators are Harry Eisner, Oscar C. Lenk and Albert F. Lenk.

MANY ORDERS FOR BAKER WAGONS.

The Baker Motor Vehicle Company, Cleveland, O., has received numerous orders for two-ton wagons for express service, one of the recent shipments being 12 machines consigned to the American Express Company, Washington, D. C., where they will be used in delivery work in that city. The company maintains that the orders received are the results of demonstrations of efficiency and economy. In many large cities the express companies are substituting the electric wagons for horse vehicles, and changes are making as rapidly as is convenient. The Baker company states that it now has orders for installation equal to that at Washington for 17 different cities, and it points out that this is the result of satisfactory work accomplished for others before the big common carrying corporations decided on the efficiency and endurance of these wagons. These orders are in addition to those which brought about 100 vehicles to New York, Bos-



Type of Two-Ton Electric Delivery Wagons, Built for the American Express Company by the Boker Motor Vehicle Company,

ton and other large commercial centres. That 70 per cent, of the year's business of the Baker company was in the form of repeat orders from satisfied users of Baker machines is claimed by the officials as the best indication of the character and quality of its electric wagons.

ELECTRIC VEHICLE ECONOMY.

With a knowledge based on experience since the concern was established the General Vehicle Company, Long Island City, N. Y., has fixed the life of an electric wagon at 10 years. This means in average work and with average care. There is reason, however, to believe that with further experience by owners this could be improved upon. The conclusion is well founded and it is conservative from every point of view.

Taking the estimate made for the vehicle of 2000

pounds capacity, which the company sells for \$2100 with an acid battery, without body, the fixed charges are given as \$470.50, which include amortization (10) per cent, annually on the purchase price), interest, fire and liability insurance, or 20.47 per cent, of the total operating expense. The replacement charges include replacements of batteries, tires, chains, gears and spruckets, bearings and all other worn parts, and these amount to \$841.5, or 25.40 of the operating expense. The garage charges include electric current, rent. light, heat, garage labor, etc., and totalled \$93.15, or 21.45 per cent, of the operating expense, leaving the driver's wage of \$750, 32.68 per cent, of the operating expense.

It will be seen that the fixed charges and the wage of the driver amount to \$1220.30, and that these cannot well be changed. Whatever economies are made must be made in what may be regarded as the operating costs, and here is the actual saving of the electric vehicle, because of its long life and endurance. Thus the operating expense may be averaged at \$1007.30 and

nually. Contrasting this with two single horses and two wagons of similar capacity: The initial cost of animals, vehicles and equipment would be \$1200. and the fixed charges would be about \$200 yearly. The cost of care and attendance of the two outfits would be \$2 a day, or \$730 a year, and the cost of two drivers would be \$1500 annually, so that the keep of the horses and the wages would amount to \$2230, and the fixed charges \$200 more, or \$2430, against the \$2297.80 of the electric wagon.

Because the horses and their equipment cost less to purchase is no criterion on which to base in dement.

The maintenance of the vehicle is somewhat more than might he paid for two horses, but with the cost of two drivers to be considered the argument is all in favor of the motor wagon. Considering 300 working days of the year the daily average cost of the electric is \$7.659, as against \$7 a day for horse keep and drivers wages alone, and the machine has at least double the mileage and equal carrying capacity.

ENDURANCE OF THE ELECTRIC MOTOR.

There is nothing mysterious about the motors employed to drive electric vehicles. The only moving part is the armature, which revolves on the highest grade ball bearings and has sufficient velocity to furnish the required power, which is applied through the jackshaft and reduction sprockets and chains to the rear wheels. The electric motor is regarded as being the most economical form of prime mover because its power can be graduated and the current necessary for a given work can be utilized. The largest and most carefully developed manufacturing plants are constructed with electric generators that produce current that is used in individual motors as required. There are establishments in which all the power is furnished by central stations and supplied for whatever nachinery is used as needed, this being more economical than operating a power system which is not always in service.

It is true that motors will wear, but they wear very slowly. They can be restored and will continue to aiford service to a surprising degree. The loss through friction is exceedingly slight. The electric street ear is in every way dependable. The electric railroad ear or motor may be used for years and is so reliable that it is used by the largest corporations engaged in transportation. These ears and electromotives are driven by exactly the same types of motors that are used in electric power wagons. They are built for hard service and to yield the highest degree of efficiency. The wearing parts are the shafts and the hearings, and these may be renewed, while the commutator segments and the brushes mas similarly be replaced.

The motors have speed of from 1200 to 2000 revolutions a minute and the work is done with comparatively little vibration. Being encased and absolutely protected from all abrasive substances, and from water and dampness, the deterioration is minimized. The only attention given is systematic lubrication of the bearings and cleaning of the communitator, which will insure continuous and effective operation.

IMPORTANT COURT DECISION.

A recent decision handed down by the Michigan supreme court in the action brought by William G. Isbell against the Anderson Carriage Company, now incorporated as the Anderson Electric Car Company, maker of the Detroit electric wagons, is of decided interest to those representing automobile manufactures. In the lower court a judgment for \$23,000 was given the plaintiff, but the higher court has reversed this decision.

The original contract between the litigants called for the maintenance of a suitable garage for handling automobiles, together with such appurtenances as are usually required in such business. An auxiliary agreement made soon afterward, provided for allowing 1sbell to place gasoline ears in the garage, as well as those of the electric type, until such time as the business in the latter should have developed to a point where the caring for them offered a sufficient business to warrant their care exclusively.

The Anderson company later notified Isbell that he was not caring for the business properly, did not advertise sufficiently, did not provide proper labor for caring for the business and was not carrying any of the ears in stock. The result was the cancellation of the agreement.

Isbell brought suit and obtained the judgment stated. The appear resulted in a reversal. The grounds appear to have been many, among others being reference to the opening of two garages by the Anderson company, with a sufficient number of employees to care for the business and to the success which has followed this policy. The advertising done and the broad policy pursued by the company were referred to and the court said it was this evident success under progressive management that had caused the bower ownt to render such a large verificit in the suit.

METER DELIVERY WAGON.

The Argo Electric Vehicle Company, Saginaw, Mich, has delivered to the Springfield Light. Heat and Power Company, Springfield, Ill., a 1000-pound enclosed delivery wagon to be used by the meter department of that corporation. This is regarded as a type that is well adapted to all purposes where reasonable engancity and extended mileage is desired. The



The 1000-Pound Electric Helivery Wagon Helivered to the Springfield Light, Heat & Power Company by the Vego Electric Vehicle tompany

body is a regular panel equipment and has a wide sent and abundant leg room, with a sightly dash and a long hood that affords complete protection for the driver, It is adapted for either summer or winter work. The wagon is geared to give a speed of 12 miles an hour when this is necessary, and the mileage of the battery is claimed to be 50 or therabours to the charge,

The Argo electric has the rear axle and the motor constructed as a unit and the drive is by herringbone gearing from the motor, giving a powerful and silent transmission. The motor is a Westinghouse and the control is incorporated with the steering column construction. There is a double set of brakes, internal expanding in drums in the rear wheels. The ratchet brake interlocks with the control so that the brake cannot be set with the power on and the power cannot be applied with the brake set. There are four forward and two reverse speeds. The springs are of the semi-elliptic form.

WAVERLEY FIVE-TON TRUCK.

The Waverley line of electric service wagons, made by the Waverley Company, Indianapolis, Ind., now includes a five-ton vehicle, the first of which was recently produced. The Waverley Company is one of the oldest concerns in the industry, perhaps the oldest now doing business, and while its experience was originally with pleasure machines, it has been making wagons for years.

This five-ton chassis is regarded as the best that has been produced by the company, it being perfected in every detail that long experience and sound engineering could suggest, and designed to have long endurance under extreme conditions of service. The chassis weighs 8660 pounds and the battery 2540 pounds, to which must be added the weight of the body installation. The chassis is built with a view to extremely heavy work, such as brewery delivery and the like, and it has a rated mileage of 35 miles a charge on what may be regarded as level roads.

The machine is driven by single motor, 85 volts, 60

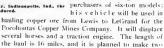
FEDERALS PERFORM SATISFACTORILY.

Where other trucks have failed, Federal trucks, made by the Federal Motor Truck Company, Detroit, are performing with satisfaction in and near Phoenix, Ariz, considered one of the hardest sections of the country on motor driven vehicles because of the extreme heat, steep grades and poor roads. A short time ago a sideboard Federal started daily trips between Mesa City and Roosevelt, a distance of 61 miles, over a mountain road with very steep grades. The round trip is made in 14 hours with a full capacity load, sometimes carrying several passengers. Another operates between Alhambra and Phoenix, hauling two trailer loads of brick. The latter has been making daily trips for nine months.

SPEEDWELLS IN CALIFORNIA.

The Speedwell Company of San Francisco, Cal., agent for the Speedwell Motor Car Company, Dayton, (), recently made some large sales in its territory, and

is now selling on factory order. One six-ton model was purchased by McNab & Smith of San Francisco and the other by the Monarch Oil Refining Company, the latter being fitted with a three-compartment steel tank for carrying gasoline. In addition it will be equipped to carry case goods on the side. This truck will be used in making long hauls to Oakland, A. E. Moutrey of Le-Grand is also among the recent





Chassle of the Five-Ton Truck Built by the Waverley Company, Indianapolis, Ind., the Largest Machine This Concern Han Vet Produced.

amperes, which is suspended from hangers at the extreme rear of the chassis frame, being protected from contact with anything that might cause damage by the heavy frame and the rear axle. The drive from the motor is by shaft to a jackshaft in which is incorporated a differential gearing, and thence by side chains to the rear wheels. The current is drawn from a battery of 42 cells of 25 plates each, having a capacity of 324 ampere-hours. The chassis is 212 inches length and the loading space is 168 inches length and 78 inches width. The wheels are shod with 36 by seveninch tires forward and 36 by five-inch double rear tires.

One of the features of the design is the truss construction that is incorporated in the suspension of the battery box, which prevents springing and greatly stiffens the frame without the need of extremely heavy material.

The Hexoline Lubricating Company has been incorporated in New York City with a capital of \$6250 for the purpose of making lubricants.

round trips with the truck each day. The traction en-IMPROVEMENT IN SOLID TIRES.

gine is averaging three round trips a week.

Commenting on the matter of tires recently, F. F. Phillips of the solid tire department of the United States Tire Company, stated that, in his estimation, no period in the history of the motor truck industry has developed such marked improvements as this department during the last year. He says;

"Within the year manufacturers have increased their mileage guarantees 2000 and in some instances 4000 miles. It now is possible for a truck owner to buy tires covered by guarantees of 10,000 miles, irrespective of the city or locality in which they are to be used. Demountable solid tires for use on motor trucks have had the effect of generally improving service."

RECENT MOTOR VEHICLE PATENTS

Weldon Spring Wheel.

A new type of spring wheel is noted in the invention of John Henry Weldon, Comanche, Okla. It has practically two rims, an inner and outer, and to he latter are attached the spokes which slide freely in hollow members. The inner rim is shorter to allow for the contraction of springs which are interposed between the two rims.

Benson Transmission Gearing.

A patent has been granted to Andrew Benson, Chicago, assignor to the Benson Gear Company. It comprises a transmission gearing including a worm mounted upon a shalt and meshing with a worm gear, the axis of the worm being angularly movable relatively to the worm gear about a pivotal axis located intermediate the ends of the worm.

Wagenhals Chassis.

An automobile chassis having two wheels in front and a single driving member in the rear, has been patented by William G. Wagenhals, Detroit, Mich. The front wheels are turned by means of the usual tierod operating the knuckles which are pivotally mounted. The power plant is located in the centre of the chassis and final drive to the rear traction wheel is by clain. An extension of the frame in front provides a step.

Morgan Loading and Unloading Device.

Ralph L. Morgan, Worcester, Muss., has been granted a patent for an unloading and loading device to be utilized with a commercial vehicle. It comprises a removable crate or body, a slip for supporting same and into which the machine may run, and means for depositing the crate upon the car, as well as for removing same. The loading operation is performed by the longitudinal motion of the truck which gradually raises the crate off its slip or support. Means are also provided for securing the crate.

Schumacher Steering Gear.

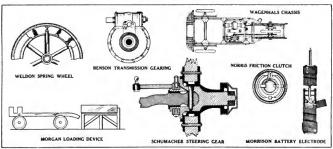
Henry Schumacher, Buffalo, N. V., has been granted patent for a steering gear comprising an axle arm having a spherical socket at its inner end, a spherical knuckle seated in said socket, the latter having a vertical pivot opening, and an upright pivot pin. Means are provided for retaining the spherical socket.

Norris Friction Clutch.

A friction clutch has been patented by Henry M. Norris, Cincinnati, O., assignor to the Cincinnati Tool. Company of that eity. It consists of a shaft having a splined sleeve and a collar secured to the latter which is fitted with a contractile ring, also an idle member on the sleeve concentric with the collar and twin levers carried by the collar and engaging with the ring. A movable wedge is provided for simultaneously actuating the levers into frictional engagement with the idle member.

Storage Battery Electrode.

William Morrison, Des Moines, Ia., has taken out a patent for a storage battery electrode, comprising a body of active material and a helically wound strip of wire gauze surrounding and enclosing the latter. Alkaline electrolytes are utilized.



Some of the Recent Efforts of Inventors Working Along Lines Applicable to the Commercial Vehicle, Iocinding a Spring Wheel, Unloading Device, Bottery Electrode, Chassis, Etc.



VOL. III. AUGUST, 1912.

AUTOMOBILE JOURNAL PUBLISHING COMPANY Times Bldg., Pawtucket, R. I.

Times Bidg., Pawtucket, R. I. William H. Black, Treasurer. D. O. Black, Jr., Secretary.

Publishers of

THE AUTOMOBILE JOURNAL THE ACCESSORY AND GARAGE JOURNAL Those Pawischet 1996.

EDITORIAL DEPARTMENT:

CARL A. PRENCH. C. P. SHATTICK.
WILLIAM W. SCOTT.

ADVERTISING DEPARTMENT:

New England...

John W. Queen, 6 Bencon Street, Boston, Mann.

Central States—
W. R. Blodgett, 25 West 42nd Street New York City.

'Phone Beyant 3728.

Western States-

G. A. Eldredge, 304 Sun Building, Detroit, Mich. Phone Cherry 2246. P. G. Lucina, 4707 Magnolia Ave., Chicago, Ill.

PUBLISHED THE FIRST OF EACH MONTH.

SUBSCRIPTIONS

The United States and Mexico, the year, \$1 in advance; Canada and Foreign Countries in Postal Union, the year, \$2 in advance. Fifteen cents the cour.

ADVERTISING BATES.

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding. Anony measurements are not considered. Correspondence on tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attencited contributions.

Entered as second class matter, February 25, 1911, at the Postoilice at Pawtucket, R. L. under the Act of March 3rd, 1879.

RESPONSIBILITY OF OPERATOR.

While it is admitted that the motor truck may safely be placed in the hands of the driver of the horse wagon it is to replace, the purchaser ought not to lose sight of the fact that the mechanical transport means a larger investment than a single animal conveyance, and that the operator's responsibilities are somewhat increased by the change. This is a decided factor in studying the modern haulage problem.

Those who are interested in impressing the business world of the thorough practicability of the power wagon take pains to indicate that the utmost economy effected is measured very largely by the maximum efficiency of the machine. In obtaining this result the chauffeur plays an important part. It follows that he should be granted every incentive to secure the utmost from his truck.

However, nothing is to be gained by urging the machine beyond its capacity, either as to loading or driving. Careful study generally will reveal leaks in the least suspected quarters. In many lines of business they will be found in the loading and unloading systems employed, and maximum efficiency nearly always obtains only when the truck is busy hauling goods.

Since the driver's responsibility is great, the incentive should be sufficient to warrant his proper attention to details. On the other hand, it not only will permit the owner to discover leaks, but assist the operator in preventing them to fit such appliances as experience has dictated are adequate for this purpose. The modern haulage problem is complex, and this is all the more true because generations of borse usage have left no dependable data upon which to base a foundation.

MOTORS IN HOT WEATHER.

It hardly seems necessary to point out that motor vehicles are not subjected to limitations by reason of weather conditions. Still, the experience of Springfield, Mass., during the recent heated period cannot well be passed without some comment concerning the comparative ments of horse drawn and motor equipment.

As is well known Springfield's fire department is well supplied with automobile apparatus. During the afternoon in question 14 alarms of fire were sounded within some three hours. Only one piece of horse apparatus was called upon to answer these, and this failed upon the third alarm. Needless to say, the motors were kept decidedly busy, and with the result that the saving in fire losses was sufficient to more than repay the original investment.

The situation is more marked in the municipal service cited, but it must be admitted by thoughtful business men that conditions are quite similar with respect to the average business life of the community. Just how much is lost during the stifling heat of the summers and the extreme cold of the winters, in depending upon horse transportation cannot be determined definitely, except where motor vehicles have been installed in competition with the less dependable outfit.

UNIVERSALITY OF THE TRUCK.

One of the most striking demonstrations which can be given the prospective purchaser of a motor truck is to stand him on a busy street corner and call his attention to the various uses to which such vehicles are being put. There is a truck for every line of business, and the big 10-ton dumper is closely followed by the 730-pound florist's wagon, while cars employed by caterers, grocers and laundries are intermingled with brewery wagons and contractor's machines carrying tons of steel griders.

This universal employment of the mechanical transport is the result of such gradual development that it fails to impress the American public, except when time is taken to note the advancement. This is particularly true when compared with the results obtaining in this field abroad.

HELE-SHAW HYDRAULIC TRANSMISSION.

Interesting Experiments in Great Britain Indicate Successful Results--Some Points of Difference When Compared with Manly Drive in America.

HE attention of English motor vehicle engineers has been recently directed toward public trials of a hydraulic drive or transmission, invented by Prof. H. S. Hele-Shaw, one of the leading motorists of Great



Britain, who also invented the Hele-Shaw clutch. For years mechanical experts have sought a construction that would eliminate the clutch, transmission gearset and differential yearing so generally used in motor driven vehicles, and varying systems have been designed with more or less promise, but few with sufficient advantage to justify their general adoption. In America the Manly hydraulic transmission has been produced commercially in motor service wagon practise, and this was described in the February, 1912, issue of MOTOR TRUCK. So much interest has been evidenced in the hydraulic transmission of power that the Hele-Shaw device is of especial import to engineers, if not to those who are seeking economy and endurance in highway haulage.

The Hele-Shaw invention employs a circulation of thin oil through a rotary pump that is coupled direct to the engine and a series of piping to motors incorporated with the rear wheels. In this it differs from the Manly transmission, which has a stationary pump and stationary motors, the final drive being by side chains to wheels on a dead rear axle. The transmission has been tested with a three-ton truck and it is stated that the power has been sufficient to climb a grade of one foot in four, description is reproduced from Motor Traction, a leading English power wagon publication:

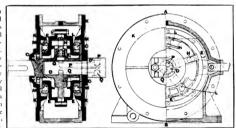
"The basis of the invention is a pump of the rotary plunger type, which is positive in action, reversible, and is variable so far as capacity is concerned. The

principle of operation may be understood by reference to Figs. 1, 2 and 3, and the drawings given in Fig. 4. the former of which show diagrammatical sections through the centre of an eight-cylinder pump at right

angles to its axis, whilst in the latter are given cross and halfsectional views of a complete pump having five cylinders. In all the figures referred to C is a cylinder body driven directly from the engine and rotated upon a central valve or 'D' tube D. in which are cut the induction and eduction ports P and O. which communicate with the suction and delivery oil pipes re-

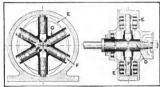
ferred to later.

"The cylinders are fitted with pistons G, provided with gudgeon pins H which pass through slots in the cylinder walls and carry on each end slippers, shown at L L in Fig. 4, which fit in circular grooves or paths cut in what may be termed a floating guide ring E. This latter, as shown in Fig. 4, is made in halves. bolted together, and rotates on ball bearings M. carried by guide blocks which slide in grooves in the main casing K, and are connected in such a manner to a control spindle or lever that they may be moved horizontally from the outside of the casing in order to vary the position of the centre of the guide ring E in relation to the centre of D. In Figs. 1, 2 and 3 the



or 25 per cent. The following Fig. 4—Cross Sectional and Half-Sectional Brawlags of the Hele-Shaw Pamp: G. Cylinder Bedy: D. Central Valve: E. Gaide Ring: G. Platana; H. Gadgeon Plas; K. Pump Casing; L. Gadgeon Pla Silppers: M. Gaide Ring Bail Bearings: P and Q. Induction and Educ-

guide ring E is represented by a dotted circle. Now when the cylinder body C is rotated in the direction of the arrows, and the position of the guide ring E is such that its centre coincides with the centre of D, as in Fig. 1, no radial movement of the pistons G takes place and no oil is delivered, but if the guide ring E be moved so that its centre is to the left of D, as in



lg. 5-Drawing of the Pump, Showing the Gudgeon Pin Silpers in Position and One of the Guides and Hall Bearings.

Fig. 2, the pistons above the centre recede from D and tend to form a vacuum, so that the working fluid is drawn through the port P, whilst the pistons below the centre approach D and discharge the oil through the port O. By moving the guide ring to the right, the reverse action takes place, namely, oil is drawn through the port O and delivered through P, although the direction of rotation of the cylinders has not been changed. It will be easily understood, therefore, that the length of stroke of the pistons, and consequently the rate of flow and discharge, is dependent upon the relative positions of the centres of E and D.

"An interesting and important feature is that, when the cylinder body C is revolved, the guide ring E revolves with it, as the resistance of the slippers in the grooves is greater than that of the ball bearings M. A great saving of power is thus obtained, and, further, it is evident that if the slippers move round the groove, the guide ring E would have to be retained full, or partly full, of oil in order to Inbricate them sufficiently, which oil would then be churned up with a consequent waste of power. As E rotates with the cylinder body C and the slippers, it can be retained full of oil by cen-

trifugal force, and yet no chnrning takes place, whilst the main casing K can be kept empty. It will thus be understood that the only place really subject to wear is where the cylinder body C runs on the central valve axle D, but this is kept so thoroughly lubricated by a slight leakage of oil that the amount of wear is inappreciable after long periods of running. It should be noted, too, that as the pressure in the system, and consequently the load on this bearing, increases, the pressure of oil in the bearing also goes up, and so counteracts the effect of this increase of

load. To give an example of the small amount of wear which takes place, we may refer to the Hele-Shaw-Martinean steering gear installed

on the Orient liner s.s. 'Orama.' During two voyages of a total distance of 44,000 miles the pump made 110,000,000 revolutions, and upon dismantling no appreciable wear could be detected. As may perhaps be gathered from Fig. 4, the majority of the pump parts are of circular form, and are thus quickly and cheaply produced.

"The principal advantages claimed for the pump are that it can be driven at a high speed, giving uniform and steady discharge under all pressures, it is perfectly balanced, has a high efficiency (shown to be 90 per cent, by experiment), it is compact and simple in construction, it is moderate in cost and weight, and is exceptionally durable. An interesting characteristic which should be mentioned also is that no special precautions need be taken to filter the oil used. The pump has been run long periods with oil containing dirt and grit, and upon being opened this has been found to become caked in the central pocket of the piston G, one of which is shown in Fig. 4. It should be stated that no packing of any kind is employed, and all the working parts are ground to fit, thus ensuring a minimum amount of oil leaking, and what leakage takes place runs through a groove in the cylinder body into the inside of the floating guide ring E, and afterwards passes through the bearings M into the main casing K, from which it is pumped into the main supply tank.

"In the type of transmission motor employed for driving the road wheels, Dr. Hele-Shaw has evolved one which alone can work efficiently, or even work at all, at the high speeds required for road locomotion, and for various other purposes to which it has been adapted. Its particular value and superiority to other hydraulic motors at present on the market lies in the fact that it can work without the shocks which occur in using high pressures with a reciprocating system in which air vessels are inadmissible. The characteristic features of this motor are covered by special patents,

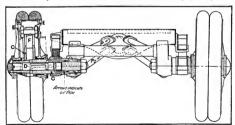


Fig. 6-Half-Sectional Drawing, Showing the Application of Dr. Hele-Shaw's Tran-alon System to a Mater Chassis Back Axle.

and are similar in certain fundamental respects to the Hele-Shaw nump, though differing from the latter in several important particulars. For instance, instead of revolving, the cylinder body can be held stationary whilst the cams (corresponding to the guide rings in the pump) together with cylindrical valve or 'D' tube

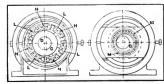


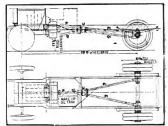
Fig. 7—Diagram Showing the Principle of the Hele-Shaw Transmission Motors.

are made to rotate. With this form of construction the rate of rotation of the valve can vary in relation to that of the cams, and the shape of the latter may be corrugated so that to one revolution of the motor any number of strokes of the hydraulic pistons may be obtained. A great turning effort can thus be secured without unduly increasing the proportions of the motor—an important consideration when the system is applied for driving the slow-moving wheels of road or agricultural tractors which are required to exert great tractive effort.

"In order to understand the action of the transmission motors installed in a motor chassis, the attention of the reader is directed to the drawing given in Fig. 6, which shows a section of one of the wheels and motors and a part of the axle. The oil is transmitted under pressure by the pump above described through the pipes P1 and P2, which are shown also in plan and elevation in Fig. 8, and communicate with a distributing valve D. The motor consists of a cylinder body C formed with six radial chambers provided with pistons, one of which is shown at F. Each of these pistons is fitted with a gudgeon pin carrying on its two ends roller bearings which run in the cam paths E.E. formed in the sides of the wheel. The cams E are of elliptical formation, as shown in Fig. 7. It should be noted, however, that this figure gives sectional views of the type of hydaulic motor used for capstans. winches, etc., and is only given in order that the action of the motor as applied to road vehicles may be more clearly understood. The oil enters the distributing valve through six holes, one for each cylinder, and is distributed to the cylinders through four holes, which are so positioned that pressure is applied to those pistons whose rollers are at the moment bearing upon the oblique portions of the cams, with the result that the wheel is caused to rotate. The cams being elliptical in shape, two strokes of each piston per revolution is made. It should be stated, however, that the form of the cams has been derived by accurate plotting, and is such that complete balance of the working parts is obtained, and at the same time any shocks in the working system are entirely obviated. The cams also give a large lap in the valve action, and

the loss by slip or leakage in passing from the suction to the pressure side is reduced to a minimum. The use of the cams enables the hydraulic motor towork under its full load, and at a high speed without injurious vibration, and without causing any serious fluctuation on the pressure gauge, even up to pressures of 1500 and 2000 pounds per square inch. This type of motor has been carefully tested with a dynamometer, and we are informed that, possibly owing to its running at a much slower speed than the pump, its mechanical efficiency has exceeded 95 per cent.

"At Fig. 8 we give general arrangement drawings, in plan and elevation, showing the application of Dr. Hele-Shaw's transmission to a three-ton motor chassis. In these the position of the pump, coupled directly to the engine, will be seen as well as the arrangement of the pipes which convey the working fluid from the pump to the road wheel motors, and also the oil supply tank. Two short pipes P and O communicating with the 'D' tube or the central valve of the pump, are led to a junction box supported by a cross member of the frame. This box is provided with a tapered plug, terminating at the rear end of a ball universal joint U. from which the two long pipes P1 and Q1 are led toconnections on the back axle through which the oil issupplied to the motors. The tapered plug is kept in position and kept oil tight by a single nut, and haschannels leading to ports in the ball of the universal joint, thus providing a passage way for the oil in thepipes P1 and O1. The short pipes P and O are bent slightly, as shown in order to compensate for any relative movement between the pump and the universal joint. The latter, which is protected by patents, gives perfect flexibility, allowing any up and down movement of the back axle, whilst the long pipes P1 and O1 perform the duties of torque rods. On the bottom of the main pump is provided another small pump, the function of which is to return any leakage of oil in



Pig. 8-Slife Elevation and Plan Drawlings Showing General Arrangement of the Hele-Shaw Hydraulic Transmission System as Applied to a Three-Ton Chossis.

the main casings of the main pump, and the road wheel motors to the oil supply tank.

"The movement of the guide ring of the main.

pump that varies the stroke of the pistons is controlled by a small Hele-Shaw pump, which is brought into operation by a pedal. When the latter is allowed to rise to its highest position the guide ring is moved so that the working fluid is transmitted in that direction which gives forward movement of the vehicle; when the pedal is fully depressed the reverse action takes place for the backward movement; when it is in the mid-position the guide ring is concentric with the central valve, so that the pistons have no radial movement

and no oil is transmitted to produce either forward or backward travel of the vehicle.

"The chassis shown in Fig. 8 has been designed in accordance with the War Office subsidy scheme specifications, which demand a minimum road clearance of 12 inches: in the chassis under construction it will be seen that an extra 4.5 inches of clearance is obtained. whilst the only portion of the mechanism that projects above the top of the frame is the pipe P, and this becomes below the seat and is thus of no account "

PIERCE-ARROW IN MILK DELIVERY.

COME interesting figures are made public by Towar's Wayne County Creamery, Detroit, which operates a five-ton Pierce-Arrow worm driven truck. made by the Pierce-Arrow Motor Car Company, Buffalo, N. Y., hanling milk, day in and day out. Two shifts of men are employed and the car leaves the garage at 3 in the morning, to return at 12 midnight,

A second round trip to this branch is taken before hinch at 6. Two more trips to the railroad depots for supplies follow lunch, then one trip to the east side branch, a total distance of 10 miles. Upon its return from the east side, there usually is another trip to the railroad station. These afternoon and evening trips are all five-ton loads with an occasional overload of

PERFECTEY PASTEL RUZER

half a ton. Mr Towar estimates it would take at least five large teams to handle this afternoon and evening work. while now it is done with two men and the Pierce-Arrow truck. It will be seen that rontes taken each day are practically the same, and the loads carried do not vary materially. Because of this condition it is possible to determine just what the truck is doing, how many wagons it has replaced and the daily mileage. No cost figures are given.

Five-Ton Pierce-Arrow in Service with the Wayne County Creamery, Detroit

Ninety-five 10-gallon cans of milk is a load for depot hanling, a total of 10,450 pounds. The daily mileage of this truck

is between 50 and 60.

after 21 hours of work daily, except Sunday, when it is utilized only 12 hours.

The machine leaves the Towar plant every morning with a load of wholesale bottled milk and cream. which it distributes to the grocery stores and factory dining rooms on the east side of Detroit. It takes from 3 in the morning until 1 in the afternoon to peddle this load and make collections. The weight of the return load of empty bottles and crates is about three tons. It formerly took three teams and one single

At I in the afternoon it makes two trips to the railroad stations for milk, being loaded with five tons each trip. The second driver takes the truck at 2, and a journey to the north end branch, four miles away, is made, with a full load of bottled goods to be delivered the following day by the wagons stationed at this branch. On the return trip it has a full load of empty bottles weighing four tons.

wagon to do this work.

Case Goods-	Chara.	Pounds Each	Total Pounds
548 quarts mllk		55	3116
1800 pints milk	. 21/	5.5	4950
100 half-pints cream	. 5	0.1	205
4st pints cream		5.5	110
60 quarts butternilk	. 5	Ti 50	295
Bulk Goods			
5 10-gal. cans milk.		110	550
6 5-gal, cans mllk		54	324
5 3-gal. cans milk		29	145
10 2-gal. cans mitk		. 21	210
5 2-gal cans cream		20	100
Total load			19.975

The city council committee of Beverly, Mass., recently voted to purchase a LaFrance combination hose and chemical wagon, made by the American-LaFrance Fire Engine Company, Elmira, N. Y. The money for the apparatus was appropriated several months ago and since that time the committee has witnessed tests and made inspections of several makes of machines, while a number were taken to Beverly for trial,

SYSTEM IN ESTABLISHING SERVICE STATION.

WHILE it is admitted that in most cities, at least outside the larger centres, the use of the commercial automobile hardly has become sufficiently general to warrant the establishment of garages devoted

Suggested Contract Covering Full Service, Six Inches Long by Three Wide.

exclusively to the care and maintenance of motor trucks, the time is not far distant when service stations of this character will be an absolute necessity. The far seeing business man, who desires to keep abreast of the situation, will recognize the truth of this assertion and begin to make provision for taking part in the development of a paying proposition.

Those who have given the matter even casual study will agree that the manufacture and sale of industrial transports must be along altogether different lines than those which have marked the growth of the pleasure vehicle side. Indeed, it is now generally acknowledged that the conditions to be met in the satisfactory placing of commercial vehicles are being more or less reflected in the handling of automobiles devoted more largely to pleasure purposes. It is only within a few years that the service station, as it is now known, has come into vogue.

Many manufacturers are establishing factory branches in the principal centres, forcing their representatives in the intervening districts to adopt measures more in keeping with the service granted by these branches. In many instances this has meant the investment of larger sums on the part of dealers, but the return in added business has been such as to amply repay for the effort and attention.

If it is possible to increase materially the business done in the sale of pleasure cars through the establishment of service stations which guarantee to the owner that his machine shall be kept in satisfactory condition at a minimum of cost, it follows that the garageman who recognizes the full value of such an investment will be in a position to meet the demands for commercial motor vehicle service when the situation in his immediate locality reaches the point where someone must supply those needs.

The question of investment must be left to individual judgment, but it may be pointed out that it is

possible to anticipate the need along this line. The garage proprietor who is firmly established in his community can easily work up a business of this character without feeling the added expense. The returns ought to be sufficient to more than offset the outlay, from the very beginning.

To cite a concrete instance, it may be stated that about two years ago a garage proprietor in southeast-ern Massachusetts adopted the policy of carring for his pleasure car owners so long as they were possessed of one of the machines represented by him. Not only does he maintain a system of periodical inspections, thus keeping the car in good order all of the time, but he undertakes to give it a complete overhaul at the end of each year, the charge for this service being \$100. His sales have increased materially since this plan was put into operation.

With a business thus established it will prove surprisingly easy to so extend the service that it may include commercial motor wagons. It will be admitted that some sort of system is necessary, and as is true of every other feature of the garage business, this system should be as simple as practical results will permit.

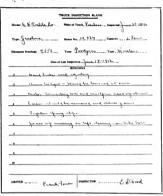
For the purpose of further explaining the proposition contained herein it will be assumed that the Eastern Garage & Service Company has been established for some time, with a growing business in the sale of pleasure cars and an agency for some well known motor truck. It follows that it has a thoroughly equipped repair department, a well lighted shop and abundant facilities for undertaking all manner of automobile work.

The location is in a city of moderate size, in which the business men are beginning to appreciate the worth of the motor truck. The Eastern Garage & Service Company believes that the future presents excellent possibilities and that the local business men



Suggested Contract Covering Weekly Inspection, Six Inches Long by Three Wide,

need the right kind of encouragement at this critical period. Incidentally, it may be remarked that this concern does not feel that the particular make of industrial transport represented by it occupies a position



Inspector's Report Blank, Eight by 10 Inches.

so unique that the product of no other manufacturer shall be considered.

As has been outlined, the concern has the necessary equipment and the opening is one which it is able to meet in a satisfactory manner. Naturally, it offers its customers garage service in its building, where the trucks sold by it may be cared for by men thoroughly acquainted with these vehicles. Perhaps it ought to be suggested that these quarters are too limited to admit of taking all the cars which might be brought to it, and as the business has not yet been developed it will be unwise to add further to the investment at this time. Moreover, there are certain business men who prefer to garage their own trucks, and for these the Eastern Garage & Service Company offers a specified service which should prove attractive.

The two contracts accompanying this discussion set forth in simple language the two types of service. In either case, the truck, no matter what the make, receives periodical and expert inspection. The character of this must be such as to keep the car in perfect working condition. A suggested inspection report is presented, and it may be added that the original is filed in the office of the service station, while a copy is forwarded to the owner of the vehicle.

The contract specifies what repairs shall be assumed by the company. It is bound to make such adjustments at once, but if the report indicates that work not covered by the contract is required, the owner is apprised of this, and can use his own judgment in the matter. It hardly will be expected that such repairs will be delayed longer than absolutely necessary.

Of course, efficiency plays an important part in the practicability of the commercial vehicle, and the owner

desires to know just how long his machine is to be kept out of service. This is a point upon which the motor truck service station must be even more particular than is true where pleasure vehicles alone are considered. If possible, a time should be set at which the owner may expect to receive his car and every effort should be made to make delivery as promised.

Having assumed that the inspector has discovered necessary work and that the owner has ordered this done, the office force makes out the accompanying repair ticket, which is attached to car on the floor. The repairman is thus informed as to what is required, and no time is lost in going over the machine. All this makes for efficiency, and guarantees to the owner that his vehicle will not be out of service unnecessarily.

Of course, it might be possible that certain repairs would escape detection even by the expert inspector, and such will develop only after the car is dismantled in the shop. Whenever such work is found the owner should be notified at once. This holds true of all repair work, but more particularly with the business man who is depending upon his motor truck. It is not to be assumed that the owner will desire to avoid making necessary repairs, but he must be considered, especially when his business is at stake. He is best able to judge whether it is practical to have the work done at this or some other time.

The obverse side of the repair ticket shows what work is to be done. The reverse has space for noting



Reverse Side Repair Ticket for Checking Time,



Stock Requisition			Date 6/29/12		
Pert No.	Model	Quantity		Price	Am'
47		2	Comercing my belt-	.10	20
		24	cotter pins		.12
		2	taken pins	.05	.10

Stock Requisition, Four Inches Long by Two Wide,

the amount of time expended upon the vehicle. This is a feature which deserves careful attention. Every garageman knows from experience how difficult it is to convince an owner that the amount of time for which he has been charged actually has been expended on his car. To overcome this difficulty, some scheme must be devised whereby the garage proprietor can show absolutely just how the time of all of his workmen has been employed. It will be admitted that the time clock solves this problem.

The repair ticket should be so constructed, of moderately heavy material, that when the repairman begins work on a given truck he can slip the ticket into the time clock, thereby recording the hour and minute at which he began operations. Whenever he is called away, no matter for what purpose, he should first visit the time clock with his repair ticket, as a result of which when the work is finished he will have a complete record of the job, to which the owner may have access whenever he wishes. Not only will this method tend to eliminate all possibility of dispute, but it will adford the office ample opportunity to check up the daily time of the workmen, thereby simplifying the work of the bookkeeping department.

This is a part of the system, which should be applied to the entire work of the garage or service station. It is quite as essential to convince the owner of a pleasure car that he has not been overcharged in this respect. And it may be added that the last set of blanks presented herewith also is adaptable to any line of repair work.

As the business of the concern grows it will become more and more evident that some system of checking up the supplies must be adopted. Under ordinary circumstances it will be found quite sufficient to make the foreman responsible for the stock room. All goods should be kept under lock and key, and when a workman requires any spare part, for instance, a simple form of requisition should be filled out. Provision also must be made for returning goods which are later found not to have been needed. A credit voucher, like that shown, solves this problem.

It may be said in passing that the system outlined for the Eastern Garage & Service Company is adapted from one which has been employed by a factory branch in one of the larger cities for the past two or three years. It has the advantage of being exceedingly simple, yet entirely sufficient for all needs. By its use the

Part No. Model Quantity Price	
	Am
1 taper frim . 1	62
	\perp

Credit Voucher, Four Inches Long by Two Wide.

garage proprietor is able at any time to gain information concerning every detail of the business.

The weekly inspection reports keep him in close touch with the owners; the repair tickets show just what work was done, how long it took and how his workmen's time was employed; the requisitions, properly checked up at stated intervals, indicate the condition of the stock room at all times.

While an attempt has been made to indicate how an established service station may take the initial steps to secure added business, which later will supply a substantial portion of its income, practically all of the system will be found applicable to the average garage and repair shop. The need for some such suitable check on the various departments is being realized more and more, and the suggestions offered herein will be found of distinct value in working out a plan to meet individual needs.

0	\
Machine Carolina Inspector, Ward	
INSTRUCTIONS	
1 aginr hand hakes	_
3 adjust comeiting sodo	_
5 Remove Contror Fring Val	
2 Poplace missing up on	_
e lift steering wars tube	_
	_

Obverse Side Repair Ticket, Four by Seven Inches.

ew Commercial CarAccessories.

B. & S. Master Vibrator.

The B. & S. master vibrator, manufactured by the Briggs & Stratton Company, Milwaukee, Wis,, is designed to synchronize the ignition of a multiple cylinder motor by utilizing one vibrator instead of two. three or four. The device is small and compact, being 5.25 inches high and 2.5 inches in diameter, and is water and dust proof

Wisco Grease Gun.

The Wisco grease gun, made by the Wilson Instrument & Specialty Company, Passaic, N. I., is produced in different styles and is designed for both oil and grease. A feature of the device is the fitting of a flexible snout by means of which the most inaccessible places may be lubricated easily, the nozzle being capable of being turned through any angle from zero to 90 degrees,

Ray Socket Wrench.

Socket wrenches are a valuable addition to the tool kit or garage as with these members nuts and bolts difficult of access are reached and adjusted easily. The Packer Anto Specialty Company, Chicago, is marketing the Ray socket wrench which is made in two sizes and includes sockets made of pressed steel, cold drawn and case hardened. The kit also includes screw drivers, universal joint device, etc. The wrench itself is of the ratchet type, nickel plated and polished.

Morgan Utility Tool.

The Morgan utility tool is manufactured by B. Morgan, Newport, R. L. who has marketed a number of practical accessories. The device comprises two slotted jaws, one of which is securely fastened to a threaded bolt while the other member is actuated by a ratchet. This arrangement permits of contracting or compressing the jaws when replacing or removing valve springs.

Victor Grease Gun.

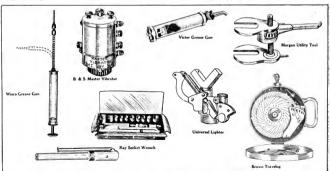
The Judd & Leland Manufacturing Company, Clifton Springs, N. Y., has brought out a grease gun that differs from those of usual construction inasmuch as the device not only holds considerable lubricant, but the latter is injected into the differential or other part by compressed air. A large aperture permits of easily filling after which a few strokes of a tire pump produces sufficient compression to force the grease to the desired part, the operation involving the turning of a net cock.

Universal Lighter.

The Universal Lighter being marketed by the Waite Auto Supply Company, Providence, R. L. is a device for igniting the acetylene gas at the headlights. The service of current or wires is eliminated as the spark is generated by a friction file passing over a sparking alloy, and it is claimed that the latter is very enduring and inexpensive.

Brown Travelog.

The Brown travelog, brought out by W. II. Brown, Cleveland, O., is a clock-like device containing a chart on which is recorded the performance of the machine such as starting, stopping, time of runs, etc.



Practical Accessories of Interest to the Owner, Driver and Repairman, Including Novel Grease Gan, Utility Tool, Universal Lighter, Brown Travelog, Etc.



FOUR-WHEEL DRIVE FOR WEBB.

Special Advantages Claimed for Couple-Gear Equipment on Fire Apparatus.

While the Couple-Gear Freight-Vheel Company of Grand Rapids. Mich., is engaged in the manufacture of electric and gasoline-electric trucks, including fire department equipment and other municipal service wagons, it maintains that the chief essential of its products is to be found in the wheels. An accompanying illustration shows a Webb aerial ladder wagon, made by the Webb Motor Fire Apparatus Company of St. Louis, Mo., utilizing the 3.5-ton parts produced by the Couple-Gear people.

The wheel itself is of hollow metal and carries the driving electric motor inside. In this particular wagon the gasoline-electric system is employed, by which is meant that a gasoline motor is utilized to develop current which is distributed to the individual electric motors within the wheels proper. It ought also to be said that another electric motor and gears are so disposed as to be utilized in raising and lowering the ladders.

The driving force is applied to each of the four wheels at two opposite points, with a balanced division of the work accomplished by the two driving pinions, one on either side, this being effected by a simple rocker device called an evener. These two driving shafts constitute an extension of the motor armature in opposite directions, and carry small bevel pinions, which mesh with very large bevel gears attached to the exterior metal casings of the wheels. One meshes with the inside gear and the other with the outside, the armature shaft being set at a slight angle to permit such action. This gives the same direction of rotation to both parts of the wheel, while

the same sized pinions and gears and like prolongations of the armature result in producing exactly similar speeds. This is necessary, as otherwise the two sides of the wheels, attached together at some points, would be driven at differing speeds, resulting in breakage as soon as power was applied to them.

A further peculiarity is to be noted in the method of attaching the axle stub on which the wheel turns, this being made integral with the motor casings within, so that an elongation of the inside stub, keyed to the taper sleve in the steering knuckle holds the motor in position. This insures that this member shall be held horizontal while the wheel revolves around it. The same construction allows of the wheel being turned around the knuckle pivot without interfering with the motor action or the transfer of the electrical current to the motor. Inasmuch as this construction is the same for all four wheels, it permits four-wheel steering and driving. The advantage of this method lies in the superior traction obtained.

FEDERAL COMBINATION WAGON.

An Equipment Designed to Meet Distinct Needs of the Smaller Municipalities.

A combination hose and chemical wagon, the apparatus having a Federal one-ton truck chassis, has just been delivered to Middleboro, Mass., for the fire department of the town, the sale having been made by the Whitten-Gilmore Company of Boston, New England agent for the Federal Motor Truck Company, Detroit, Mich. The body was designed and constructed, and the equipment was provided by the Monahan Vehicle Company, Providence, R. I.

It is claimed by the body maker, and by the agent for the vehicle, that the apparatus is not only in every



Webb Aerial Ladder, Fitted to 3.5-Ton Gasoline-Electric Chassis, Itilizing Couple-Gear Wheels and Motor Equipment,

way complete and up-to-date as measured by fire department requirements, but the price is exceedingly moderate, so that equipment of this character may be within reach of the comparatively small municipality or fire district, wherever there exists a hydrant system. The chassis is a Federal model D, which has a wheelbase of 144 inches, and a weight of 3300 pounds. The chassis is in every way the Federal standard with L head type of four-stroke cycle, water-cooled motor, rated at 30 horsepower by the manufacturer, this being a conservative estimate. The bore is 4.25 inches and the stroke is 4.5 inches, the cylinders being cast in pairs with the water jackets integral. The engine is designed for heavy duty and it is given its rating at a maximum of 1000 revolutions a minute, it being fitted with a governor that is set for a speed limitation, and the minimum engine speed is from 175 to 200 revolutions a minute.

It is claimed for this engine that it is particularly adapted for fire department service because of its flexible. The motor is lubricated by splash from constant levels maintained in oil pits in the bottom of the engine case by a gear driven pump, the lubricant being filtered before it is drawn through the pump and distributed through the system.

The drive is by a leather faced cone clutch through two universal joints and a shaft to a selective sliding gear transmission, giving three forward speeds and reverse, the gearset case being supported forward by a bracket centred in a cross frame member, and being bolted to the jackshaft housing. The jackshaft shell is supported by globe bearings carried in brackets on the frame side members. The transmission, or the transmission and jackshaft, may be taken out without disturbing the power plant. The drive is by double side chains to wheels mounted on a dead rear axle. The radius rods are of a design to preserve the relation of the rear axle and the jackshaft and relieve the springs of all driving strains.

With the chassis adapted for fire department pur-



Federal Due-Ton Chassis, Equipped as Hose and Chemical Apparatus by the Monthan Vehicle Company, Providence, R. L. Delivered to the Town of Middleboro, Mass.

design for hard work and service reliability, the ignition being an Eisenaun high-tension magneto, there being no spark advance. So efficient is the ignition that a quarter-turn of the crank will start the motor under practically all conditions. The gasoline supply is fed by gravity, the earburetor being adjusted for a fuel level at the factory, and it is claimed that the highest efficiency may be obtained with the use of the foot accelerator, there being no throttle lever.

The power plant, which includes the clutch assembly, is installed at the forward end of the chassis frame, the engine being supported on four large cored arms that are bolted to the frame side members. The radiator is mounted on brackets that are carried on solid guides, between helical springs, the guides being bolted to the chassis frame. By this construction the radiator is not subjected to any of the stresses of chassis twist or distortion. The connections between the motor and the radiator are extremely large and poses the engine speed reduction is to afford a maxinum of 30 miles an hour vehicle speed. The drive is at the left side and the control levers are for the left hand, so that driving through traffic the roadway is seen to the best advantage and there is no need for a driver to remove his right hand from the steering wheel.

The body is deep, with two hose crates, open at the rear ends and at the sides, the cover or top of the crates forming the seats for the firemen. The leg room between the crates is 11 inches in width. The reates have a capacity for 1000 feet of regulation fire hose, this being packed coupled, 500 feet at either side. At the inner side of the crates are rolls to facilitate handling and prevent wear of the wood when laying the hose. A brass rail surmounts the sides and at the rear curves downward and ends at the wide step extending the width of the entire vehicle. There are two single handles at the niner sides of the hose crates to com-

venience the firemen entering or leaving the machine while it is moving.

Above the forward end of the body on stout brackets is the basket of heavy wire containing 150 feet of chemical hose, and above this basket is suspended a bell of the locomotive type, which may be rung from the body or the driver's seat. At either side of the bracket, at the front corners, is a hand lan-These are held by clamps and are instantly detachable. At either side of the body is a 25-foot extension ladder, and a 16-foot pike pole. At either end of the rear running board is a hose nozzle. Forward of the body and behind the seat of the driver is the Badger 40-gallon chemical tank, with a large filler cap at the centre. The control of the tank and the outlet, the gauges and the valves, are at the left side. The fuel tank is beneath the driver's seat, which seat may be lifted on hinges to permit filling. On the left side of the seat is the bulb horn. Two oil lamps are mounted at the sides of the dash, and in the centre of the dash is a large swivelling search lamp that is lighted by acetylene gas from a tank. This gas tank and two hand fire extinguishers are mounted on the right running board. The other equipment of the apparatus includes a crowbar, axes, cotton hooks and the usual tools that are carried.

The front fenders are of the usual type, but long and sweeping, and the side running boards are fair length, the rear fenders being of scroll form to protect the body and they extend from in front of the jackshait to the rear running board. On the left running board is the long tool box. The wheels are shod with cellular solid tires. The centre of gravity of the vehicle is low and it is claimed to be practically free from side swave.

The apparatus is painted vermillion and decorated with gold leaf and is decidedly attractive. After its delivery by the body builder to the representative of the Whitten-Gilmore Company at Providence it was demonstrated to the officials of the fire departments of Providence and Pawtucket, and the accompanying illustration was made just as the Pawtucket delegation, headed by Chief Butler and consisting of the city council committee on fire department, was starting for a tour of the different fire stations in Providence, the purpose being to show the machine to all the firemen of that city. Later it was similarly demonstrated in Woonsocket, R. I., Attleboro, Mass., and other towns and cities where the municipal authorities are interested in fire equipment, and where it was given a decided attention.

HORSES FAIL IN SPRINGFIELD.

Series of Alarms During Heated Period Demonstrate Value of Motor Apparatus.

Several New England cities have been visited by an incendiary recently, Waterbury, Conn., and Worcester, Mass., being the first sufferers. July 5, in the midst

of the extremely heated period, Springfield, Mass., experienced 14 fires between 12:30 and 3:45 in the afternoon, most of them apparently being of incendiary origin. Nearly all of the fires were in the district bounded by the Arch, Carew and Chestunt streets, and the Connecticut river. Once or twice two alarms came over the wires almost simultaneously.

As is well known Springfield is plentifully supplied with motor fire equipment. The only horse drawn apparatus to answer these alarms was that stationed at the Hooker street house, and the horses were unable to respond to the third alarm, on account of the weather. The Knox and Couple-Gear equipment at the other houses answered all alarms without difficulty, the only financial loss for the total of 14 fires being in the Sacred Heart church, where choir vestments valued at \$500 were destroyed.

PUMPING ENGINES IN PANAMA.

Two of Webb Manufacture Undergo Satisfactory Trials in the Canal Zone.

The Panama Canal authorities recently received two motor fire engines from the Webb Motor Fire Apparatus Company, St. Louis, Mo., which have been placed in commission at Ancon and Cristobal. The machines, according to the Canal Record, were subjected to tests under the direction of the mechanical engineer and the chief of the Canal Zone fire department and were not found wanting in any manner.

One of the engines on a test run covered 7.9 miles in 25 minutes where sharp turns and heavy grades were encountered. The engines are of six-cylinder type, 80 horsepower, and must be able to run 50 miles an hour on a level road and 20 miles an hour on a 12 per cent. grade. Each machine carries 1200 feet of hose, and is supplied with a root ladder, extension ladder and two three-gallon fire extinguishers. The pumps have shown a capacity of 400 gallons of water a minute through two 300-foot lines of hose with 1.25-inch nozzles.

The Canal Commission, Washington, D. C., made a requisition some time ago for the purchase of a motor tractor to take the place of horses in drawing the No. 3 Silsby fire engine, stationed at Cristobal, but the bids failed to show where it would be practical, and the idea has been abandound for the present.

KISSELKAR MAKES FAST TIME.

Develops Remarkable Speed in Official Test Before Being Placed in Service.

An accompanying illustration presents the Kisselkar fire wagon, made by the Kissel Motor Car Company, Hartford, Wis., and recently placed in service with the New Orleans department. It is fitted with a 53 horsepower engine and is guaranteed to make a speed of 50 miles an hour. As a part of its official test, the machine was given a three-mile run under the direction of Chief Louis Puiol. During this it was forced to halt four times on account of other vehicles being in the way, and to make four turns that were decidedly dangerous. Six and one-half minutes after it left the house it was throwing water three miles distant.

The car will be in charge of Auto Hose Company No. 1, the members of the crew being as follows: Captain, John Ward; lieutenant, Victor Legarde; hoscmen, E. Raymond, J. Dutal, George Monier and R. Sanders

FIRE NEWS FROM MANY CITIES.

Will Pass on Bids-Prof. Charles E. Stewart of Tufts College, Medford, Mass., and also of the faculty of the Franklin Union, Boston, has been appointed by the finance commission of Boston, to act in an adfrom the house, and once outside announced his intention of trying to climb to the top of Newall Heights. the greatest elevation in the city. A doubt had been expressed a number of times as to whether the city had a machine in any of its departments that could make the hill, but the Knox, with Fireman Avery at the wheel, and containing the mayor, Chief Harris and a newspaper man, made the climb without any difficulty whatever.

Motor For East Liverpool-The mayor and city council of East Liverpool, O., have recommended the purchase of automobiles for the fire department. It is proposed to secure a car for the fire chief, a triple combination engine, hose and chemical wagon for the central station and motor trucks for three outlying fire stations. It is believed that at least \$2400 annually can be saved by motorizing the department.

All But Four Horses Gone-But four horses will



visory capacity in passing upon bids for fire apparatus purchased by the city.

Macks for New York Department-The New York City fire department commissioners recently awarded the International Motor Company's New York branch the contract to supply the city with five two-ton chassis, mounting combination hose and pumping engine bodies for the suburban service of the department. They will be of the Mack type, and are to be delivered within four months. Five leading makers of trucks and motor fire fighting apparatus made hids for the contract.

Knox Given Severe Test-The Knox automobile chemical, made by the Knox Automobile Company, Springfield, Mass., stationed at what is known as the Tower Hill station in Lynn was recently subjected to a severe test. Without any intimation of what he intended to do, Mayor Connery ordered the machine

Fifty-Three Hursepower Kisselhar Fire Wagon Recently Placed in Service with the Department in New Orleans.

be left in the San Diego, Cal., fire department service when the motor equipment, for which the people voted \$80,000 at the last bond election, is installed. The new apparatus will do away with 28 horses in the department. Those that remain will be used on supply and fire alarm wagons.

New Machine for Boston-The Boston, Mass., protective department is to receive another addition to its motor driven apparatus this being a special 1.5-ton truck of 40 horsepower. The machine will be equipped with an electric lighting system and a self-starter. It will accommodate from 12 to 20 men, and will have room to carry 28 rubber covers in addition to its regular equipment.

Springfield Has New Ladder-The Springfield, Mass,, fire department has another electrically propelled ladder truck similar to the one which has been stationed at headquarters for some time. The new apparatus cost approximately \$10,000, it is stated, and has been installed in the new Pine street station, affording better protection to that district, which heretofore relied upon horse drawn equipment. The new machine is of the Couple-Gear storage battery type, made by the Couple-Gear Freight-Wheel Company, Grand Rapids, Mich.

Leavenworth Wants Motors—Following a visit to Kansas City, Kan., recently, where they watched tests and demonstrations of motor fire apparatus in use there, Fire Commissioner Dolde, Mayor Doege and Chief Bahler of Leavenworth, Kan., decided that their city would need at least two pieces of modern fire fighting apparatus this fall, and have advocated the expenditure of \$10,000 for their purchase. The money will be raised, if necessary, by some kind of special levy.

American-La France in Maryland-A new 110 horsepower machine made by the American-La France Fire Engine Company, Elmira, N. Y., was recently placed in commission by the county commissioners of Baltimore county, Maryland, Following a test, the machine was sent to Catonsville, and the 70 horsepower vehicle which has done service there, was transferred to Gardenville. The new apparatus is capable of making 70 miles an hour. It is a combination clientical and pumping engine, the same power that operates the engine being used to operate the pumps. The car is of six-cylinder type, and is equipped with 1500 feet of 2.5-inch hose, 20 feet of five-inch suction hose, a 40gallon chemical tank, 200 feet of one-inch chemical hose, three extinguishers, one 22-foot extension ladder and one 12-foot roof ladder. The engine capacity is 800 gallons a minute through three lines of hose.

Altoona Buys Knox—Altoona, Pepp., recently closed a deal with General Agent Harry Silverman for the purchase of a Knox combination chemical and hose motor truck, made by the Knox Antomobile Company, Springfield, Mass. The machine is to be delivered within two months, and its purchase is the first step toward the ultimate motorization of the entire fire apparatus of Altoona.

Victor Apparatus in Pueblo—Pueblo, Col., recently purchased a combination free engine, made by the Victor Motor Truck Company, Buffalo, N. Y. Many changes will result from the installation of the new machine. It will replace six horses, three pieces of horse drawn apparatus, including a steam engine, an aerial truck and a hose wagon, and cause a reduction in the force at the engine house where installed from eight to six men.

Philadelphia to Motorize—Steps toward the motorization of the entire equipment of the Philadelphia, Penn., fire department are being taken by Director Porter of the fire bureau. Bids have been asked for 12 motor cars to be used by the chief of the bureau and his 11 assistants. These are to cost approximately \$40,000. Bids are to be asked for tractors for a water tower and a hook and ladder, and estimates have been asked for a new hook and ladder. The installation of the motor apparatus will necessitate a reorganization of the department.

Poughkeepsie Buys White—A 40 horsepowr combination chemical and hose wagon, made by the White Company, Cleveland, O., was recently bought by the fire department officials of Amsterdam, N. Y. The apparatus will be constructed along lines similar to those of the machines in service in Mt. Vernon and Poughkeepsie.

Chicopee Favors Home Product—Mayor Rivers and Chief Pomphret of the fire department in Chicopee, Mass, are contemplating the purchase of a chief's wagon from the Stevens-Duryea Company of Chicopee Falls. It will carry chemical tanks and other fire fighting equilpment.

In the Market-Among some of the cities contemplating the purchase of motor fire apparatus might be mentioned the following: Minneapolis, Minn.; St. Paul, Minn., to consider motorization of entire department: Milwaukee, Wis., common council recommends purchase of combination hose and chemical; Grand Rapids, Mich., to open bids for a number of pieces; Butte, Mont.; Council Bluffs, Ia., anticipates purchase of several pieces; fire committee, Athens, Ala., inspecting apparatus with view to purchase; Tampa, Fla., two hose and chemical trucks; Gaffney, N. C.; Reading, Penn.; Canton, O., asks bids for seven pieces; Alhambra, Cal.; Echo Park, Cal.; Tekaham, Neb.; Delaware, O.; Beaver, Penn.; Norristown. Penn.; West Chester, Penn.; Jackson, Tenn.; Memphis, Tenn.; Abilene, Tex.; San Diego, Cal.; Coffeyville, Kan.; Lansing, Mich.; Easton, Penn.; appropriation of \$5000; Mansfield, O.; Superior, Wis.; Iowa City, Ia.; Anaheim, Cal.; Peobody, Kan.; Mansfield, O.; Highland Park, Mich.

TENTH REPEAT ORDER FOR ALCOS.

The American Express Company recently placed its 10th repeat order for Alco trucks, a source of considerable gratification to the maker, the American Locomotive Company of New York City and Providence. R. I. The contract specifies a fleet of five of 3.5 tons rating for the New York service. The new machines, equipped with standard express bodies, will be placed in the heavy duty work. Their routes will include night trips between the express company offices and various shipping terminals, in addition to a regular day schedule. The express company has found the trucks a saving over horse drawn equipment, and during the past three years has added 46 Alcos. An experience in connection with one purchase of three trucks was the operation of these in the company's Chicago branch. The net earnings for the motor vehicles in eight months were \$5747, an average of \$1915.66 for each truck. A comparison of the cost with horse drawn vehicles resulted in favor of the motors, while the service was considered much more efficient.



AINTS·FOR·PROPER MAINTENANCE

A Department for the Owner, Driver and Repairman.



RENOVATING OLD LUBRICANTS.

By careful attention to small details the manager or proprietor of the repair shop can effect a decided saving in expenses during the year. It is surprising to note the amount of lubricating oil that is wasted in the average shop and that more devices have not been developed for economizing the lubricant. Many workmen make it a practise when overhauling a mechanical transport to throw away the old oil, and this habit is not confined alone to the repair shop, but prevails in many private garages and service stations. In the course of a year this waste amounts to a considera-

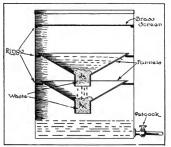


Fig. 1—011 Filter Devised by Owner of Repair Shop, Which Saves Lubricant Formerly Thrown Away.

able total and the greater portion of the oil could be saved if filtered properly.

One manager of a large repair shop who watches small details very carefully to keep down the overhead expense, devised a filter which, he states, proved practical and was the means of saving many gallons of lubricant during the season. The device is depicted at Fig. 1 and consists of a round tank, a fine mesh brass screen, two ordinary tin funnels, an extra vessel, some metal tubing and a petcock. The container outlined was a five-gallon can the top of which was removed.

Three projections were soldered to the walls of the container to support each funnel and the screen. The bottom of the tank was drilled and a .25-inch copper tube soldered and led to the extra vessel conveniently located. A petcock was installed in the line so that the dripping oil might be shut off while the receiving member was being cleaned.

When the old oil is poured in at the top of the tank the wire screen separates bits of metal and foreign elements and the lubricant flows to the first funnel, being filtered by the loose waste. Thence it passes to the second member where the process is repeated. The filtered oil is remarkably clear and the inventor of the device states that he utilizes it in his car where it has given satisfactory service.

DRILL PRESS HINT.

When a piece of work is so small or of such shape that it cannot readily be bolted to the drill press table it can be kept from turning by placing a stiff piece of emery cloth between it and the table.

CONVERTED WING NUT.

Wing nuts are useful devices, as these members facilitate the removal and replacement of parts about the automobile and its accessories. A simple method of converting ordinary nuts into wing members is illustrated at Fig. 2 A. It consists of drilling two holes in the nut and driving a staple through the openings, peining over the ends of the staple. The latter should be long enough to pass through the nut as well as to provide means for rotating it.

HOME MADE MICROMETER.

Many operators of commercial vehicles are clever at constructing mechanical devices which facilitate the maintenance of the car and an instance is noted of a driver who produced a micrometer, a useful tool when fine measurements are to be made. The frame was cut from heavy sheet metal and to the shape depicted at Fig. 2 B, the end being rolled over to form openings .25 and .375 inch outside diameter. A piece of brass tubing, .375 inch outside diameter and two inches long, was fastened securely to the larger opening. On

the other end of this tube was brazed a nut tapped with a .25-inch tap, having 40 threads. The sleeve was made of another piece of tubing large enough to go

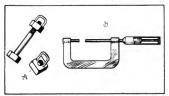


Fig. 2-Some Repair Shop Suggestions: A, Converting Ordinary Sat into Wing Member: B. Home Made Micrometer.

over this nut. Next a bushing was fitted in one end of this sleeve and the other beveled to about 45 degrees. The bevel was divided on its circumference into 25 parts, numbering every fifth graduation, beginning with zero.

A four-inch rod was threaded about half way to fit the nut and fastened in the other end of the sleeve with a bushing. The anvil was a piece of .25-inch rod fastened on the opposite frame opening, and allowed to project. 5 inch inside the frame. Next the sleeve was run down until the screw came in contact with the anvil and a mark made on the stationary tube to register with the zero mark on the sleeve and at right angles to it. The sleeve was turned one revolution and another mark was made. This operation was continued until the caliper was opened to its fullest capacity. One complete turn equals 1-25 of 1-40 or 1-1000. Half and quarter-thousandths can be estimated readily.

CRITCHLEY EXPANDING REAMER.

Reamers are a valuable addition to the shop equipment as they are useful to enlarge holes to size. A complete set of these members in order to take care of different work means a large investment. The Critchley patent extending reamer, manufactured and marketed by Chadwick & Trefethen, Portsmouth, N. H., is designed to do the work of several instruments, inasmuch as the cutters are adjustable, permitting the reaming of odd sized holes, a feature which will be appreciated by the average workman.

The reamer is shown at Fig. 6 and it will be noted that a screw thread is cut on the body of the tool on either side of a space. The latter is left uncut to insure stability. Five grooves or slots are made in the shank to take the cutters which are beveled at each end and held securely by nuts. When in normal position a standard size is obtained. An enlargement is secured by loosening the retaining nuts and moving the cutters in the grooves, increasing the diameter of the cut.

Very fine measurements may be secured easily. The graduations vary by sixteenths, beginning at .46875 inch diameter, although in larger sizes the reamers

vary from .125 to .25 inch. The device is not very expensive and extra cutters are obtainable for a small sum. The reamer is constructed of high grade material and all parts are strictly interchangeable.

AUXILIARY SEARCHLIGHT.

One of the most important accessories of the delivery type of commercial vehicle is a suitable light, one that will permit of reading house numbers where the streets are dimly illuminated. Considerable time is wasted by the driver in searching for the proper address and many times it requires the services of a pocket or oil light.

At Fig. 3 is shown the novel method of mounting an auxiliary acetylene lamp by a driver of an automobile whose duties carried him into the suburban districts where the street lights were poor. He purchased a five-inch swinging dash light and mounted it as depicted in the drawing. The supports were constructed of a piece of cold rolled steel, bent to the shape illustrated and made to take the pivotal arm of the lamp which was connected to the main line of the gas tank by tubing. Being fitted with a petcock the light could be shut off or used as desired. By it the operator was able to note the house numbers without leaving the seat.

HISEY ELECTRIC BREAST DRILL.

The up-to-date repair shop and many private garages have discarded the old-fashioned hand drill in favor of the tool operated by electricity. By it considerable time, as well as labor, is saved and the work performed more accurately as the workman can hold the instrument steadier than with the manually operated member. At Fig. 4 is presented one of three types manufactured by the Hisey-Wolf Machine Company, Cincinnati, O. The motor is operated by a direct current of 110 or 220 volts and the instrument is equipped

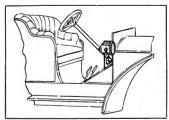


Fig. 3-Novel Method of Fitting Small Acetylene Swinging Lamp to Delivery Car.

with two side handles, one detachable and one combination end, and a breast handle. The speed of the motor varies according to the design, being from 400 to 900 revolutions a minute. An offset chuck, permits of drilling in close corners.

The motor is completely enclosed, air-cooled, the



protected by a brass screening, thereby preventing cuttings from getting into it, no matter in which position the drill is operated. The gears are cut from solid steel, hardened, run in grease, and are separately encased.

the housing and

Fig. 4—Hisey Partiable Electric Drill.

The brush holders and wire connections are also enclosed, preventing short circuiting.

The operation of the drill is controlled by a patentcl, enclosed automatic switch which controls current by means of a brass trigger operated through the permanent handle. It is claimed that this construction prevents the operator burning his fingers or short circuiting the motor, and that the drill is under control at all times. The handles are of hellow steel tubing serewed into the housing, and each attachment plug has a fusible cap, protecting the motor from overload. The drop cord is connected on the outside of the motor housing which has an insulated cover, preventing any possible damage by lead wires and inside connections should it be accidentally torn loose.

SACHS MAGNALAMP.

An electric lighting device which will appeal to the repairman, machinist and the driver who takes care of his car, has been brought out by the Sachs Laboratoties, Inc., Hartford, Conn. It is similar to the ordinary electric lamp with the exception that it is equipped with a magnetic extension which carries a highly efficient electro-magnet combined with the lamp and connection socket, and a switch in a cylindrical structure.

The device will adhere to iron or steel surfaces, smooth, rough or uneven, painted or unpainted, and its grip is unaffected by heat or cold. A main switch is provided, this being only operative when the magnet attachment is not in use. It is operated by a knurfed disc forming the central pole piece of the magnet, completing closing or opening the circuit with each snap. Pressing a push button on the side on the cylinder releases the grip of the magnet so that the lamp may be placed, removed or changed instantly. Releasing the button brings the magnet into service again. After the light has been turned on by the switch the current continues to flow irrespective of the manipulation of the magnet.

The Magualamp requires a direct current and is furnished in two standard voltages, 110 and 220, for

use with 16 caudlepower carbon filament lamps. If utilized with lamps of less candlepower the magnetic grip is said to be less, due to the small amount of current, as the 110-volt member requires about .5 ampere and the 220 about .25 ampere. The device is made for service with higher candlepower and for use with other voltage than those designated. In addition to being of service when operating the lathe, drill press, miller, etc., it will prove of value when working on the motor car as it may be attached readily to any metal part of the chassis, facilitating the work. It is not expensive and for a small sum may be augmented by a counter balance device which permits the use of the lamp either with or without the magnetic member. At Fig. 5 is depicted one of the many methods of employing the Magnalamo.

CORRESPONDENCE

Canse and Effect of tuxillary tir.

(2). The company I am employed with has a converted pleasure vehicle, the motor of whith skips when travilled down, but operates all right when speeded up. A friend of mine who he well up on valumobilis asparents that the trouble is all the speeded up. A friend of the whole the state of the transition of the chains at the providence, R. I. July 15.

1. Trovidence, R. I. July 15.

Considering first the effect of auxiliary air upon the operation of motor, it must be remembered that so many parts of air are mixed with one part of gasoline by the carburetor to produce the proper mixture. If the mixture is thinned by additional air drawn into the combustion chamber through leaks in the intake manifold or other components of the carbureton system the vapor is not ignited easily and the explosions are erratic. When the motor is speeded up the suction created by the piston is increased, there is a steady pull upon the carburetor and the mixture is not affect-



Fig. 5-Depicting Sucha Magnalamp, a Device Self-Adhering in Melal by Menas of Electro-Magnet.

ed if the leaks be small. Being approximately correct in proportions the vapor ignites readily, producing an even running motor.

There are numerous places where auxiliary air may find its way and among these may be mentioned the connections between the carburetor and intake pipe,



6-Critchley Expanding Renmer, Fitted with Adjustable

those of the manifold, valve caps, valve guides, etc. In an old motor the latter are most likely to be the cause of trouble and at Fig. 7 is depicted a worn member also outlining how auxiliary air finds its way between the guides and valve stem and thins the mixture. The gaskets and connections should be examined carefully. but in the case referred to it is probable that the trouble is caused by worn stems and guides. If worn they should be replaced with new bushings as it is impossible to adjust the carburetor so that it will produce a satisfactory mixture at both high and low speeds.

Clutch Drugs

(8)-Am experiencing considerable difficulty in changing speeds as the gears grind. In coming from high to second I have to slow the motor down to almost nothing else I cannot get the second in mesh. How can the trouble be remedied? DRIVER.

Dallas, Tex., July 14.

The trouble may be caused by the clutch dragging, due to a worn bushing, or the intertia of the flywheel not being overcome; that is, the male member spins after the clutch is released making it difficult to change gears until the member on the main shaft rotates at a speed approximating that of the gear to be engaged. Examine clutch, withdrawing the member with the motor running and note if it continues to spin unduly. If it drags its bearings should be examined. Relative to overcoming the inertia of the flywheel, if it be the cause of difficult gear changing, it may be overcome by the fitting of a clutch stop, several designs of which and their method of installation were outlined in the June issue of MOTOR TRUCK.

High Speed Disc Broken.

(9)-I employ a small runabout for light delivery work which has given good service until recently. The transmis-sion is of the planetury type and when the high gear lever is sion is of the panetury type sind when the high Rear lever is thrown in, the motor races and the car does not gain head-way for some time. In climbing hills I have to go into the tow when formerly the machine would climb easily on the high gear. Have taken up the adjusting mechanism to the limit but the slipping continues. What is the cause of the trouble, and the slipping continue how may it be fixed? INFORMATION.

Worcester, Mass., July 20.

The symptoms indicate a cracked high speed disc, which spreads and does not grip properly. The member is accessible and may be examined for cracks and if broken should be replaced with a new part. The transmission will have to be removed and disassembled to fit the new plate which will not be expensive. If not familiar with the operation it is best to have the work performed by a repairman.

New Versus Second Hand Car.

(10)-Am contemplating purchasing a small delivery ma-(10)—Am contemplating purchasing a small delivery machine for service in the laundry business for carrying work on long distance trips. Have been offered a second hand pleasure car d a reasonable price, but a motoring friend advises me to secure a new automobile. Would appreciate it very much if you will give me the benefit of your experience and LAUNDRYMAN. on the subject.

New London, Conn., July 17.

Although there are many second hand pleasure cars which have been converted into commercial vehicles and these have given good service, the writer believes a new machine, one designed especially for the service referred to, would be more satisfactory in the end. The conditions under which a commercial car operates are different from those of the pleasure vehicle, among which may be mentioned starting and stopping, continuous service, etc. Manufacturers of the mechanical transport have taken into consideration the peculiar demands and have strengthened those parts subject to stresses. There are numerous light delivery cars adaptable to the laundry business which would be far more economical to maintain in the long run than a converted second hand pleasure car.

KNOX COMPANY GETS CONTRACT.

The Knox Automobile Company, Springfield, Mass,, recently received the award of a contract to supply the city of Altoona, Penn., with a combination chemical engine and hose wagon.

PURCHASES MOTOR HORSE AMBULANCE.

The Louisiana State Society for the Prevention of Cruelty to Animals recently purchased from the General Motors Truck Company, Detroit, a specially designed horse ambulance which will be used in New Or-

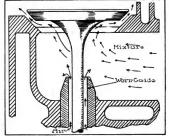


Fig. 7-Outlining How Worn Valve Stems and Gulden Allow Auxiliary Air to Wenken the Mixture.

leans. The body is of special construction with side and end doors and a movable floor. It is mounted on a standard 2.5-ton G. M. C. chassis.

POREIGN TRUCK NOTES OF INTEREST

SAUTTER-HARLE MUNICIPAL WAGON.

Detailed Description of Interesting Combination Vehicle Now in Service Abroad.

In a recent issue of MOTOR TRUCK mention was made of a new type of garbage wagon in use in the city of Rouen, France. This is produced by Sautter-Harle et Cie, Paris, and since the successful demonstration in Rouen, the vehicle has become a standard product of this concern. Accompanying drawings bring out the details of construction.

The chassis does not depart greatly from the usual practise. The motor is a four-cylinder unit, having bore of 105 mm and stroke of 150 mm (4.13 by 5.9 inches), with the cylinders cast in pairs, and all valves on one side. The design is such that henzol is the fuel most generally employed, although gasoline may be utilized if preferred. The crankcase is of bronze. Lubrication is by force feed to all parts.

The entire mechanism, motor and transmission, is carried on a substantial sub-frame securely fastened to the transverse frame members. The transmission housing is of bronze and a universal joint is interposed between this and the clutch. The differential is carried in a separate cast steel housing in the countershaft. Final drive is by double side chains. A feature of the wheel equipment is the use of steel tires, which are said to have given excellent satisfaction on a number of vehicles in France.

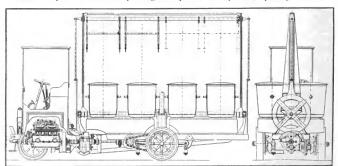
As stated in a previous article, the body is designed

primarily for the handling of garbage, which is collected from the individual house bins in large receptacles. The truck body is constructed to hold eight of these in two rows along the side, as shown in the side elevation herewith. The end elevation presents the mechanism for hoisting these bins into place on the wagon.

This consists of two steel columns, united by a fixed cross girder, and a moveable transverse member to which the bins are attached by chains. These obtain their movement from a set of gears within the transmission case, there being six different positions possible. All four bins on a side may be unloaded together, or each may be picked up separately. The truck may be loaded or unloaded from either side. It is understood that the services of but one man are required for this purpose.

In addition to this work, two shallow tanks, having a capacity of some S80 gallons, are located at the rear of the vehicle, these being a permanent fixture and the bins being located above them. It will be noted that the sprinkling devices are located at either side just behind the rear wheels. Provision also is made for pumping out flooded cellars, etc., the construction being such that the pump may be operated by the motor whether the truck be standing still or in motion.

By the use of these combination vehicles, the city is able to take care of the garbage collection problem during the early hours of the morning, and utilize the truck for street sprinkling and sweeping later in the day. The economy effected by this plan is obvious.



Side and Rear End Elevations of Sautter-Harle Truck Designed for Garbage Collection and Street Watering Purposes

Several French cities have been giving the matter serious study, and it seems decidedly probable that the influence of the Sautter-Harle will be felt in other countries in the near future.

NEW DE DION AMBULANCE.

Splendid Example of Neat Construction Providing Every Convenience.

The De Dion-Bouton Company of France recently delivered a new type of motor ambulance to the municipal hospital at Mulhausen, Alsace-Lorraine, Germany, which presents a decided advance in the construction of such vehicles on the Continent. Heretofore, American manufacturers have had little to fear from European producers in this respect. The latest car is in reality a two-bed hospital on wheels.

From the front or side, the vehicle cannot be told from a privately owned limousine, except for the word "Buergerspital" in gold letters upon the door panels. Two doors are provided at the rear, similar to those in see on an ordinary delivery van. Inside, there is ac-

commodation for two wheeled stretchers, lying horizontally, one above the other, and supported by spring suspenders, which entirely do away with any unnecessary jar or shock. Both stretchers can be removed or placed back in position in a very short time, the upper one being lowered or raised by a crank driven chain and sprocket tackle. Seats are provided for a nurse and a doc-

tor, and accommodations for restoratives, dressings, anæsthetics, and even surgical instruments for use in cases of extreme emergency.

The chassis is a four-cylinder, 25 horsepower model, and is fitted with pneumatic tires on the rear wheels. An idea of the completeness of the body and internal fittings may be realized when it is known that the price of the entire vehicle is £550 (\$2076.88) more than the cost of the chassis without tires.

WHITE NEWSPAPER DELIVERY.

Teamsters' Strike Provides Demonstration That Means Permanent Installation.

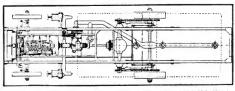
The use of motor trucks in America has become so general, at least in respect to the numerous lines in which they have proved their practicability, that it is extremely difficult to cite instances in which the industrial transport has not been given a trial. Conductions are decidedly different abroad, and particularly is this true in England. It was not until the recent teamsters' strike in Great Britain, that many concerns had ever given serious consideration to the possible and ever given serious consideration to the possible.

bilities of the motor vehicle in commercial work.

An accompanying illustration shows a three-ton White truck, made by the White Company, Cleveland, O., in service with the London Daily News. Although the White Company has maintained a branch in London for a number of years and the White pleasure cars, both those propelled by steam and gasoline engines, have enjoyed a splendid popularity in all of the British dominions, it is somewhat surprising that the London Daily News had not been convinced of the advisability of utilizing a vehicle of this type instead of horses.

However, the strike tied up practically all horse transportation in England, and the News was left with a large supply of paper at the docks. Unless it could get this delivered at its offices, there was grave indication that the paper must suspend publication. Then it was that the utility of the White truck was brought home to the company in a forceful manner.

So satisfactorily did this car perform its task in this emergency, that the London Daily News decided to be entirely independent of horses in the future. The truck in question was purchased and has been in constant



Sketch Showing Plan View of the Sautter-Horle Combination Municipal Vehicle Channing

use since that time. Incidentally, the installation is expected to prove of decided value to the American motor truck industry throughout the British Isles.

GENERAL NEWS FROM ABROAD.

For Solid Tire Standard Size—There is a strong feeling among the trade and the manufacturers of England that there should be a movement toward the standardization of solid tire sizes. Users have complained that they cannot make tests of various styles of tires as they would like, because of the varying sizes. It has been pointed out that rims can be turned down to fit, but there is objection to this process on the part of some for fear the rim would not prove so durable. It is expected that a move will be made soon toward the realization of standard sizes.

Fire Engine in Lausanne—The municipality of Lausanne, Switzerland, with about half the population of Geneva, has requested \$5983 from the city legislative body for the purchase of an automobile fire engine. Such engines are already in use in other Swiss cities, Basel, Berne and St. Gall. The pumps are worked by the engine motor, and have a flow of 800 to 1300 liters (214 to 344 gallons) of water a minute.

Opening in Latin-America-A business man in a Latin-American country has expressed to an American consul his intention to establish a dray line of motor trucks in the city in which he is located, as soon as the streets are rebuilt, which will take place in the near future. He would like to hear from American truck makers regarding their products, and would be glad to receive catalogues in Spanish, and other particulars that would be of value. The address can be secured at the Bureau of Manufactures, Washington, D. C. Still another foreign trade opening for American manufacturers is reported by a consul in Australasia. The manager of a motor car company there has told the United States representative that he would like to secure a line of American made electric motor trucks.

Passenger Service in Brazil-That greater facilities



Three-Ton White Truck in Service with the London Dally Sens for Hauling Paper Stock. company also intends to ac-

for handling freight and passengers between inland cities in Brazil may be provided, the government recently passed a law relative to the upkeep and repair of the roads. This law provides for the granting of concessions securing to the concessionasies, during a period of 30 years, the sole right of carrying goods and passengers by means of motor vehicles over existing state roads, upon condition that the concessionnaires rebuild the roads, and maintain them in a condition suitable for motor and wheeled traffic during the time of the concession.

Want Fire Apparatus—The town council of Edinburgh. Scotland, has decided to purchase three motor fire engines and two motor tenders. Estimates for the cost of this equipment are being received, the plans and works committee having charge of the bids. The corporation of Bury. Lancashire. England, is also to purchase fire fighting apparatus, and has asked for tenders for the supply of a motor tower wagon. The general manager, Central Tramway offices, Bury, will provide prospective bidders with necessary information regarding requirements.

For Good Roads in Cuba—The Association de Buenos Caminos, a good roads organization, was recently formed in Cuba. The membership is composed largely of automobile owners, and its object is to increase the mileage of good roads and to prepare and publish maps of those now available on the island.

Show in Sydney—One of the features of the automobile show in Sydney, N. S. W., a short time ago, was the exhibit of motor trueks, tractors and business wagons. Practically all of the leading English manufacturers of commercial cars and tractors and motor wagons suitable for use in farm work were among the exhibitors. An American exhibit was that of the Avery tractor, made by the Avery Company, Peoria,

Ill., and exhibited by the Canada Cycle & Motor Company, Ltd., of Sydney. Plans are under way for another exhibit of similar character in September at which Americans are urged to make display.

Taxicab Company in Melbourne—The Globe Motor & Taxi Company, Ltd., was recently formed in Melbourne with a capital of £50,000 (\$234,325). The company proposes to establish motor 'bus passenger services where paying traffic can reasonably be assured, the hiring of taxicabs and other passenger vehicles, and the hiring of commercial and industrial trucks. The

quire Carey's taxicab and motor biring business, and the cars, plant and machinery of the late D. M. A. Field, as well as several agencies. The directors are: Sir Henry Weedon, K. B.; Sir Alexander Peacock, K. C. M. G.; Alderman Edward G. Gurr and Ralph Archbold. A. V. Renowden is to be the general manager.

Truck Line in Venezuela—A 30-year exclusive contract has been signed between the Venezuelan government and Norberto Borges, which provides, upon congressional approval, for automobile service over an extended territory—from Valencia, passing through Tocuyito, Tinaquillo, Tinaco, San Carlos, Acarigua Cospino and Guanare, to Barinas, with a branch from Acarigua to Barquisimeto. The enterprise may establish auxiliaries in the states of Cojedes, Portuguesa and Zamora, after securing government consent. The first section of the line must be in operation within a

year, and the entire system within three years. It is stated that the country through which it is proposed to run the line is rich and productive, and that sufficient traffic can be found to make the venture profitsble.

Ambulance for Johannesburg—The Anglo-French Garage Company at Johannesburg. Cape Colony, recently secured a contract through the town conneil to supply the city with a motor ambulance. The chassis will be manufaceured by the Leyland Motors, Ltd. Leyland, Lancashire, England, and the body will be constructed in Johannesburg. Steps are to be taken, it is said, by prominent business men in Johannesburg to form a company for the maintenance and operation of a service of motor omnibuses, with possibly a regular service to Pretoria. The matter is only in an embryo state at present.

Trials for Reapers—The Automobile Club de France recently held a demonstration for motor driven reapers and binders at the national agricultural school at Grignon. The classes provided for were reapers, or reapers and binders, laving all or a part of their apparatus driven by an internal combustion motor. The trials were based on the useful work accomplished, the fuel, oil and water consumption, and the net cost. No rewards of merit were given, but all firms entering received certificates of the results obtained.

Big Business at Elstow—Saunders & Gifkin, Elstow, Bedford, England, recently erected additions to its plant, included in which was a foundry and smith's shop. The business that this firm is doing in the manufacture of motor trucks for farm use inruishes a good illustration of the increased interest that is being taken in various parts of the world in the utilization of the motor vehicle for work in agricultural districts. The firm is now constructing machines to be sent to South America, New Zealand, Nyassaland, Russia and Italy.

Regulations in Montreal-Montreal, Can., proposes the adoption of bylaws for the regulation of public passenger carrying motor vehicles in that city, which among other things require that a seat shall be provided for every person carried. The carrying capacity of each vehicle is to be determined by an official of the city and the limit shall not be violated. Between the hours of 8 and 10 in the morning and 5 and 7 at night, companies operating motor 'bus services must provide machines every five minutes on authorized routes. The fare charged must not exceed five cents, and transfers good at terminal points must be provided on application. The speed limit will be nine miles an hour, and four in crossing streets or turning corners. The conductors shall be required to speak both English and French, and must call the places of stoppage in both languages.

Exhibit Tractors in Austria—One of the principal features in connection with the Bohemian Annual Agricultural Exhibition, held recently at the Prague ex-

hibition grounds. Austria, was the increased display of traction engines and machinery made in Germany. The number using gasoline as a motive power was double that exhibited in 1911.

Motor Fire Engine for Windsor,—The Windsor, Ont., fire department will be equipped with an automobile fire engine this year if a recommendation of the fire committee is approved. According to present plans a vote of the rate payers will be required before the purchase can be made. A similar proposal was submitted last year and voted down, but the members of the city council and water commissioners are agreed now on the necessity for the new apparatus and it is believed a favorable vote of the people can be secured.

Consul Announces Opening—An American consul in a foreign country has submitted a complete statement concerning the demonstration trial of motor trucks to be held in his district during September, the exact date of which has not been determined. As a result of these tests it is expected that 30 to 40 cars will be purchased by the government for use in certain branches of the service. He states that American cars seem to be looked upon with favor, and that their merits are frequently commented on by officials in the country in question. A copy of the complete report, containing the conditions governing the trial, can be secured by applying to the Bureau of Manufactures, Washington, D. C.

CROSS COUNTRY DELIVERY SYSTEM.

A motor vehicle service has been established between the towns of Sharon and Mercer, Penn, by the Sharon-Mercer Auto Transit Company. One 12-passenger touring car was put in commission and another has been ordered for immediate delivery. Later, it the service requires it, other automobiles will be bought. The distance between the two towns is approximately 14 miles, and the first machine to arrive has been making three trips daily each way. Better accommodations will be provided as soon as the second car arrives.

INSTALLS TIRE CHANGING OUTFIT.

Under the direction of C. W. Martin, Jr., manager of the motor truck ire department of the Goodyear Tire & Rubber Company, Akron, O., a new hydraulic press and tire applying machine for motor trucks was recently installed at the Philadelphia branch of the concern. The new equipment is said to be the best of its kind in the country, and according to Mr. Martin, motor truck tires can now be changed in a quarter of the time that was required before the machine was installed. The new machinery includes a 75-ton hydraulic press, hooping plate, small drill press, band saw, radial drill and other up-to-date devices.

WOLVERINE-DETROIT EMPLOYS FRICTION DRIVE.

A NEW commercial vehicle of the light delivery type, having a capacity of 800 pounds, is the Wolverine-Detroit which has just been placed in the market by the Pratt, Carter, Sigsbee Company, Detroit. The design is notable for compactness and throughout the best grade of material and workmanship have been incorporated, which with several movel constructional features will appeal to those seeking a light machine capable of efficient service at a low cost of maintenance. The power plant has many commendable features and is located under the driver's seat at the right with left hand control. Simplicity of operation is made possible by one lever, that controlling the friction drive, which is at the left of the motor and which supplies an indefinite number of speed ratios.

The valve caps are ample in size and are fitted with a hexagonal head. The intake member is tapped and drilled to take a priming cup, a desirable feature in cold weather. Particular attention has been paid to the matter of cooling and both the water jacket and pipes circulating the fluid are extremely liberal.

Cooling.

Circulation is by the thermo-syphon system, cold water entering the water jacket at its lowest place, passing around the exhaust valve and surrounding compartments and flowing out through the top of the motor at the left and thence to the radiator. Both in-let and exhaust water manifolds are liberal in size, being retained by a stud and look nut, an arrangement nemitting of cleaning of the water jacket when de-



Change of the Wolverine-Detroit Light Delivery Vehicle Which in Fitted with Friction Drive and Many Novel Constructional

The power plant is very compact and is close to the right side frame, its suspension making for a low centre of gravity. The motor is of the four-cycle. water-cooled type, the single vertical cylinder having a bore of 4.5 inches and a stroke of 5.5. It is pointed out by the designer that it develops ample power for the weight and carrying eapacity of the machine when fully loaded. The evlinder proper presents a square shaped appearance with the intake and exhaust valves located on the right, these being of the cone poppet type, 2.25 inches in diameter, making for easy passage of the mixture and burned gases. The valve mechanism is fully protected from dust or dirt by an oil tight cover of liberal dimensions and is retained by six bolts. The cover and cylinder are machined, insuring an accurate fit and making possible operation of the valve stems and springs in an oil bath, reducing wear to a minimum.

sired. The large vertical tube radiator is located in the dash, protection being provided in from by a bumper bar while the rear is covered by the floorboard. Special attention has been paid to the suspension of the radiator it being such that removal is an easy matter and road shocks are climinated.

The crankshaft is of a high grade steel, carefully ground, and extra large babbit lined bearings are employed. The connecting rod is also of high grade material with large babbit bearings and access to these as well as other components of the motor is made possible by the removal of a large inspection plate.

The intake pipe is located in front of the motor as is the carburetor and the latter is a float feed, automatic type having but one adjustment, that of the fuel. The exhaust pipe is at the rear of the eylinder, ample in size and its curve is gradual to the muffler which is in a straight line, an installation reducing back present.

557

sure, created by the exhaust, to a minimum.

The motor is suspended on a sub-frame, the rear member carrying the actuating mechanism of the driv-



Bight Side of Wolverine-Detroit Power Plant Outlining Method of Sameralon Under Driver's Seat.

en disc and being very substantial. Although secureyanchored to the main frame it may be removed readily if desired. Two large extensions of the motor casting are bolted to the sub-frame, which is carried well below the main member, a construction making for easy access to and the removal of the lower crankcase. This carries the main shaft bearings, which may be adjusted easily without disturbing the crankcase. An extension of the crankshaft at the right of motor provides for attachment of the starting crank.

Ignition.

Ignition is by jump spark with a high-tension coil and multiple dry cells. The latter are located just forward of the fuel tank in a position convenient to the operator and the control switch is at the right of the driver. A feature of the wiring system is its simplicity, and the removal of the driver's cab or body does not require disconnecting any of the leads. It is pointed out by the maker that the dry cells being wired in multiple and the motor a single-cylinder, these members will supply proper current for thousands of miles without replacement.

Lubrication.

A constant level splash system of lubrication is employed, the dipping of the crankpin and connecting rod splashing and carrying lubricant to the cylinder walls, piston, etc. Provision also is made for an additional lubricator of the gravity feed type and this member is very accessible and easily operated.

The timing of the spark in the combustion chamber is obtained by a circuit breaking device mounted just above the extension of the crankshaft. A finger like cam attached to an extension of the camslaft actuates a trembler blade, making and breaking contact, completing and interrupting the primary circuit. The trembler blade is mounted in a movable housing attached to which is a rod connecting with the spark

control lever on the steering wheel, and advance and

The usual tank is constructed of heavy material, of large capacity and is mounted over the flywheel of the motor being retained by straps bolted to the main and sub-frame.

Friction Drive.

As a friction drive is employed the usual clutch and transmission gears are eliminated, reducing weight. By it any number of speed ratios are obtainable in either a forward or reverse position, these ranging from a very few miles an hour to the maximum output of the power plant. The face of the flywheel is provided with a friction disc as is the periphery of driven disc and it is claimed by the maker that the machine may be operated fully loaded through deep sand or on heavy roads without either member slipping.

The flywheel is fitted with a large high grade ball thrust bearing while the driven disc is mounted on a liberal sized shaft operating in two annular bearings. This shaft is connected directly to the pinion shaft through a double Spicer universal joint assembly, one of these members being located directly back of the the sub-frame carrying the driven disc actuating mechanism while the second is fitted in front of an extension of the differential housing to which is attached the torsion rod. The latter is of pre-sed steel, webbed, and is carried slightly outward and secured to a bracket device attached to the sub-frame.

Axles and Springs.

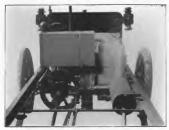
The rear axle is of the fixed bub type and large Timken roller bearings are utilized throughout. The driving shafts are of a high grade nickel steel and the pinion and crown gears are of the same material, carefully cut and accurately meshed. Semi-elliptic sorings 40 inches long and 1.75 wile of carefully tem-



Depleting Bear View of Motor and Novel Method of Locating Steering Column Between Operating Pedats.

pered high grade steel are fitted both front and rear, the latter being secured to the axle housing by liberal sized spring clips. The front axle is a Timken I beam section type equipped with roller bearings and the knuckles and spindles are of ample size. The tieroid is located behind the rear axle, protecting it from road obstructions and is of the adjustable type. The reacherol operates transversely, it being pointed out by the maker that its arrangement makes for easy steering. The steering gear and operating pedals are carried on the subframe at the left and a feature of the steering column is its location between the clutch and brake pedal. The lever controlling the operation of the driven disc is also at the left. Steer is by the usual hand wheel.

The brakes are of the internal expanding type located on the rear wheel. They have liberal friction surface and even contact is secured through an equalizing rod. The frame is of channel steel construction with corners securely braced by gussel plates and all connections are riveted. Access to the driver's seat at the right is by means of a metal step secured to the frame, thus eliminating the running board.



The Friction Driven Disc is Located at the Left of the Motor and the Driving Shaft Provided with Double I siverani Joints,

The wheels are of the artillery type, of carefully selected wood. The front members have 10 spokes and the rear 12, these being 1,375 inches. The standard tire equipment is 32 by 3.5-inch pneumatic, or 34 by 2.5-inch solid clincher. Quick detachable rims are fitted as standard with the pneumatic tire equipment. The choice of tires is optional.

The standard body size is 40 by 64 inches although special bodies are constructed to meet the requirements of the purchaser. The open express body lists slightly less than the top body, and both members are highly (mished. The driver's seat is upholstered with a high grade leather, and the cab is integral with the body. The issual standard equipment of lamps, horns, tools, etc., is turnished.

WILL FEATURE MOTOR TRUCKS.

With an idea of featuring the motor truck, the Fillow Anno Company of Danbury, Conn., a short time ago purchased two lots of land immediately east of

the company's garage on Crosby street, that city, and will commence at once the erection of a large addition to its plant. The new plot has a frontage of 75 feet and a depth of 150 feet. The property at present occupied by the company's buildings is 50 by 100 feet, so that the addition will practically triple the space utilized by the concern.

G. M. C.'S IN SAN FRANCISCO.

The total number of users of G. M. C. trucks in San Francisco is 133, which is quite a tribute to the product of the General Motors Truck Company, Detroit. The largest number owned by one firm is eight, the next five, with several owning two or three. The lines of business in which these are used are greatly diversified.

VELIE WINS HILL CLIMB.

A Velie light delivery wagon, made by the Velie Motor Vehicle Company, Moline, Ill., was first in the delivery class in the Bargor, Me, hill climb, recently held, and was only defeated by one car in the free-for-all. The truck was supplied by A. J. Shorey, agent for the Velie product in Bargor. The car was not stripped, like a number of other competitors, but went into the contest with the regular equipment, including delivery body.

SPEEDWELL SAVES MONEY.

An exceptional reduction in the cost of hauling copper ore in the mines of the Calaceras Copper Mining Company of Copperspolis, Cal., has been made by the introduction of motor trucks. L. V. Lynch and R. Harry Croninger of the Speedwell Motor Car Company, Dayton, O., recently succeeded in inducing the officials of the mining company to purchase four sixton Speedwell trucks. The result is that comparative figures, kept since the motor vehicles were placed in commission, show the ore is hauled from the mines at a cost of 80 cents a ton as against a cost of \$3,50 when horses were used.

KISSELKAR PULLS TWENTY TONS.

A KisselKar three-ton truck, made by the Kissel Motor Car Company, Hartford, Wis., performed a remarkable feat in Kauss, City, Mo., the other day when it moved a 37,000-pound boiler, placed on an old-fash-ioned wooden wheeled truck weighing 6500 pounds, a distance of 1.25 miles in 40 minutes up a three per cent. grade. Twelve horses had been assigned to the job, and it was estimated that the moving would require at least 10 hours. The up-grade part of the route was over asphalt and the weight of the trailer and boiler was so great that the wheels sunk at times as much as two inches into the pavement. The KisselKar carried no ballast, and performed its task with apparently no trouble.

NEWS OF THE COMMERCIAL VEHICLE INDUSTRY.

Recently Organized Stewart Concern Announces Its Line--Gramm Reveals Future Plans--Willys Adds Another Plant---Several New Trucks Coming.

The plant recently vacated by the Niagara Machine & Tool Works at the corner of Randall and Superior streets, Buffalo, N. Y., has been secured by the Stewart Motor Corporation, recently formed by T. R. Lippard and R. G. Stewart, who on June I, withdrew from the Lippard-Stewart Motor Car Company of Buffalo. Orders for machinery, equipment, etc., are being placed and the building will be put in condition for occupancy as rapidly as possible. Manufacture will be started as soon as convenient, so as to fill orders already received for early fall delivery.

Light trucks will be made by the new company, to be known as the Stewart, named after the designer, Mr. Stewart. Automobile men who have seen the new models proclaim them as far ahead of anything of the kind on the market, and say the new cars are bound to meet a ready sale.

Mr. Lippard is president and general manager of the new company and Mr. Stewart is vice president and chief engineer. R. P. Lentz, for several years connected with the London & Lancashire Fire Insurance Company, Hartford, Comi, is secretary and treasurer, while Robert W. Ingersoll, recent branch manager of the Firestone Tire & Rubber Company in Buffalo, will be sales manager.

GRAMM REVEALS PLANS.

Joins With Bernstein and Others from Old Concern in the Production of New Models.

B. A. Gramm, who retired from the Gramm Motor Truck Company a short time ago, when the controlling stock in that concern was acquired by President John N. Willys of the Willys-Overland Company, Toledo, O., has formed a partnership with M. Bernstein, formerly a director in the Gramm company. The new concern will be known as the Gramm-Bernstein Company, and it will devote its energies to the exclusive manufacture of trucks.

A very close corporation has been formed with a capital stock of \$\$0,000.0 of which \$\$0,000.0 is common and \$20,000 preferred. Mr, Gramm is vice president and general manager; Mr. Bernstein is president and H. O. Bentley, secretary. Fred Biszantz, one of the best known men in his line in the country, formerly designer and factory superintendent with the Gramm company, will occupy the same position with the new concern.

A large plant has been purchased, to which additions are being constructed. When these are finished the factory building will provide 125,000 square feet of floor space. All the structures are equipped with the most modern lighting system, are well ventilated, and particular attention has been paid to their sanitary appointment. They are located on the main line of the Pennsylvania and D. T. & I. tracks, the best of facilities for shipping being provided.

Members of the corporation have been working on the business for considerable time, and it is their intention of placing on the market a truck, which is as near perfection as possible. They anticipate that specialization in truck making for many years has fitted them to place the best of products before the public. Already the company has orders for half of its next year's output. It is the aim to produce commercial vehicles that will themselves prove the company's best salesmen.

BRENNAN TRUCK INTRODUCED.

Three Models to Be Produced by Syracuse Concern Heretofore Prominent as Motor Manufacturer.

The Brennan Manufacturing Company, Syracuse, N. Y., for a number of years maker of gasoline engines, has placed a truck on the market, and in the future will devote a part of its plant to the manufacture of commercial cars. Three models are to be produced—one of two tons capacity, equipped with a 35 horse-power Brennan four-cylinder motor; one of three tons capacity and 38 horse-power, and a third, a five-ton vehicle, using a 45 horse-power remine.

The machines will employ progressive transmission, thermo-syphon water cooling, Bosch dual ignition, cone clutch and semi-elliptic springs, with auxiliary cross springs to carry the overload. Robert J. Rothwell, formerly in the truck department of the II. II. Franklin Company, Syracuse, N. Y., will be in charge.

JEFFERY MODEL READY.

Well Known Maker of Rambler Pleasure Line Is Prepared to Enter Commercial Field.

Although the Thos. B. Jeffery Company, Kenosha, Wis., well known maker of the Rambler pleasure line, displayed a L-5-ton truck at the Chiego show in February, little has been heard concerning this product since that time. Exhausive tests have been under way, however, and the company is now ready to place the vehicle on the market. It will be known as the leffer,

The motor is located under the seat and footboards, and is rated at 38 horsepower. It is of the vertical, four-cylinder, water-cooled type. A Bosch high-tension magneto is utilized and lubrication is by a combination force feed and splash. The transmission provides three speeds forward and reverse. Final drive is by side chains. The steering wheel is on the left hand side.

The frame work is of pressed steel, the total length being 185 inches, with 120 inches back of the driver's seat. The stock body is 60 inches wide and the same length of the frame back of the seat, and is of the platform style. The wheelbase is 120 inches. All springs are semi-cliutic.

Two sets of brakes are employed, the service brake being operated by the pedal, and the emergency is with a hand control. The service brake drums are on the countershalt and the emergency drums are on the rear wheels. Front and rear wheels are 34 inches in diameter, the front being shod with four-inch solid tires and the rear with three-inch solid dual. The gasoline tank is located under the seat, having a capacity for 20 gallons. The lubricating oil supply is one gallon.

THE NEW YORK SHOW.

Automobile Board of Trade Lays Plans for Next Year's Exhibition in Two Buildings.

Arrangements for the annual commercial vehicle show in New York City, to be separate from the exhibition of pleasure cars, were considered at a recent meeting of the Automobile Board of Trade. The display will be held in two buildings—the new Grand Central Palace and the Madison Square Garden, although but one admission will be charged. The dates are Jan. 20-25, immediately following those for pleasure cars in the same buildings Jan. 11-18. Resolutions were passed on the death of Alfred N. Mayo of the Knox Automobile Company, one of the oldest members of the board, and a leader in the automobile industry since its inception.

Those present were: M. L. Downs, Autocar Company; W. C. Leland, Buick Motor Company, Cadillac Motor Car Company, Cartercar Company, Elmore Manufacturing Company, Marquette Company, Oakland Motor Car Company, Olds Motor Works, Rapid Motor Vehicle Company, Reliance Motor Truck Company; Hugh Chalmers, Chalmers Motor Company; James C. Dryer, James Cunningham, Son & Co.; G. H. Stilwell, H. H. Franklin Manufacturing Company; G. W. Bennett, Garford Company; E. W. Headington, Haynes Automobile Company; E. H. Broadwell, Hudson Motor Car Company; Howard M. Davis, Knox Automobile Company; William T. White, Mercer Automobile Company; William E. Metzger, Metzger Motor Car Company: James M. Cram, Mitchell-Lewis Motor Company; W. H. VanDervoort, Moline Automobile Company; E. J. Moon, Moon Motor Car Company; George M. Dickson, National Motor Vehicle Company; C. C. Hanch, Nordyke & Marmon Company, Premier Motor Manufacturing Company; M. J. Budlong, Packard Motor Car Company; L. H. Kittredge, Peerless Motor Car Company; Charles Clifton,

Pierce-Arrow Motor Car Company; George Pope, Pope Manufacturing Company; Oscar Stevenson, Pullman Motor Car Company; F. B. Stearns, F. B. Stearns Company; J. E. Quimby, E. R. Thomas Motor Car Company; Windsor T. White, the White Company; Alfred Reeves, United States Motor Company; John N. Willys, Willys-Overland Company; C. W. Churchill, Winton Motor Carriage Company; H. A. Bonnell, general manager.

SECURES NEW BUILDING.

Buffalo Electric Concern Laying Plans for Construction of Commercial Cars and Baggage Trucks.

The recently organized Buffalo Electric Vehicle Company, Buffalo, N. Y., has closed a deal whereby it secures control of the entire building at Main and Barker street, formerly occupied by the Denniston Company, and used by it for the construction of automobile bodies. The new structure is desirable for manufacturing and display purposes and is up-to-date in every respect.

According to present plans the plant formerly occupied by the Babcock company will be used for the manufacture of electric commercial vehicles and electrically driven baggage trucks, while pleasure cars will be manufactured on the upper floor of the newly acquired building. On the main floor of the latter building a large retail salestroom will be conducted, where will be displayed the various models of pleasure and commercial cars. Under the new arrangement the Buffalo Electric Vehicle Company has the most imposing salestroom in the city, and one of the finest in that section of the country.

WILLYS BUYS OUT GARFORD.

Elyria Plant Added to the Holdings of Interests Controlling Overland and Gramm Factories.

President John N. Willys of the Willys-Overland Company, Toledo, O., recently secured control of the Garford Company, Elyria. O., maker of the Garford truck. For some time previous to the transaction the Willys-Overland Company had an agreement with the Garford Company whereby it had general supervision of marketing of the Garford product. Now the Willys interests will also have charge of the manufacture.

Mr. Willys has been elected president and George W. Bennett vice president, these being the same positions they occupy in the parent Willys holding company. Mr. Bennett plans to spend a day each week at the Garford plant, as well as a day a week at the plant of the Gramm Motor Truck Company. Lima, O., also recently secured by Willys interests. Mr. Garford sailed for Europe following the disposal of his interests, accompanied by M. D. Johnson of Cleveland. O. his attorney and business adviser.

WILL BE REORGANIZED.

New Albany Venture to Be Resumed with New Capital Invested in Motor Truck Construction.

A reorganization of the American Automobile Manufacturing Corporation in New Albany, Ky., with Ferdinand Kabler of New Albany as president and general manager, will follow the approval of the sale of the plant of the American Automobile Manufacturing Company, which passed through a receivership that terminated recently in its sale for \$45,000, it is said. Mr. Kabler and O. E. South of Cincinnati have acquired 55 per cent, of the stock of the new company and they have joined interests.

Mr. Kahler is president and general manager of the Kahler Company, general wood worker in New Albany, which for several years has made a specialty of the manufacture of automobile beds. It is stated that the new company will devote practically all its attention to the manufacture of motor trucks.

ADDITIONAL ITEMS OF INTEREST.

Martin Tractor Incorporators—The Martin Tractor Company has been formed in Indianapolis, Ind., and has been incorporated under the laws of the state for \$350,000. C. H. Martin is the head of the new concern and the other directors are Hugh R. Richards, F. B. Davenport, Edward D. Moon and George D. Thornton. It is the intention of the new company to produce the Martin three-wheeled tractor, which is now manufactured under a shop license by the Knox Automobile Company, Spring-field, Mass.

Nyberg Trucks on Large Scale—The Nyberg Automobile Works, Anderson, Ind., recently made the announcement that in the future it would manufacture trucks on a large scale, these being of 3000 pounds capacity. One, loaded to its full capacity, was in the Indiana Four States tour, the test being one of the most severe to which a gasoline truck was ever subjected.

Siebert Factory Enlarged—Work is progressing rapidly on the construction of the new three-story factory building being creeted in To-ledo, O., by the Shop of Siebert. The structure, when completed, will be 75 by 125 feet, and it is expected will provide plenty of floor space for this part of the company's business for some time to come. It will be of steel and reinforced cement construction. The Shop of Siebert was organized in 1853 to build carriages and wagons. When the automobile came into prominence the concern gradually worked into this line and has been exceptionally successful in making and marketing the Siebert truck.

Heads Morgan Company—Charles B. Foster, for the past 10 years president of the Foster & Richardson Bedstead Company of Westboro. Mass., recently withdrew from that firm to become president of the Morgan Motor Truck Company in Worcester. Up to about eight months ago, Harry Unwin of New York was president, but at that time he returned to his old position. Since then the position has been held by Charles H. Derby of Worcester, a lawyer, pending the time when the right party could be secured for taking the position permanently.

To Make Russell Trucks—The Russell Motor Car Company, West Toronto, Can., is contemplating the manufacture of a complete line of light delivery wagons and heavy trucks, it is claimed. The company a short time ago amounced an increase in capital stock, and the bond issue was almost at once over-subscribed by Toronto capitalists. A new plant is in course of construction which will be used exclusively, it is believed, for the manufacture of commercial motor vehicles. Plans of the company are expected to be forthcoming within a short time.

Produces Lumber Vehicle—A new truck, designed for the exclusive hauling of lumber, has been placed on the market by the Henry Lee Power Company of Chicago, maker of the Old Reliable line of commercial vehicles. The new model has a standard stake body, 15.5 feet long and six feet wide, of the removable type, two extra bodies also being furnished when desired. Rollers in the platform of the body make the changing of the bodies when loaded comparatively easy, and also prove a great aid in dumping loads. Racks are also furnished on each side of the body, capable of holding lumber 24 feet in length. The wheelbase is 144 inches.

Brown Organizes Company-Will H. Brown, with a number of business associates, formed the Brown Commercial Car Company in Peru, Ind. It is the intention of the new concern to manufacture and place on the market a light delivery wagon. Mr. Brown is the president of the concern and Carl H. Wallerich is the vice president. the latter resigning as manager of the General Industrial & Manufacturing Company of Indianapolis to join the Brown forces. The former is president and general manager of the Mais Motor Car Company of Indianapolis, in which capacity he will remain in addition to devoting considerable time to the new concern. The plant formerly occupied by the Otis Elevator Company has been secured.

New Factory in Pittsburg—The Pitt Motor Truck Company was recently organized in Pittsburg, Penn. The capital stock of the concern is \$200,000, which is being subscribed readily. Members of the firm are J. E. Douglas, E. P. Douglas, W. S. Phillips, F. R. Brandt and J. McCalmont. It is the intention of the concern to manufacture comnercial cars exclusively, and it is hoped that a factory may be started sufficiently early to place the first product on the market by fall.

WINNIPEG AGRICULTURAL TRIALS.

American made machines carried off the honors in the fifth annual contest of agricultural motors, tractors and plows, held at Winnipeg, Can., July 2 to 20 inclusive. The event was well attended, attracting farmers from hundred of miles, and although 25 machines competeil as compared with 27 of the previous year, it is interesting to note that a higher degree of efficiency was attained both in the gasoline and kerosene classes. The original entry list included 29 machines and of this number 25 competed, 13 being of the gasoline type. eight kerosene and four steam. Last year 15 gasoline machines took part.

The contest was decided upon economy brake and maximum brake test, plowing, design and construction, and an added feature of interest to this year's tests was the engine gang plow competition, when the various developments in the large plow outfits were tested to show the farmer what could be accomplished with a thoroughly modern equipment. The points upon which the judges made their awards were; Drait, evenness of furrow depth, lay of furrow slices, evenness of cut of inside plow, ease of adjustment and manipulation of plow in and out at ends, straightness of furrows, and stops attributable to plow.

The gasoline machines were divided into two classes: B, cubic piston displacement of 300 cubic feet a minute, was won by the product of the I. I. Case Threshing Machine Company, 411.7 points; C. gasoline, piston displacement of 500 cubic feet a minute, went to the Aultmann-Taylor machine, 447.7 points.

The heavy fuel machines were divided into two classes. D and E, for motors of 500 cubic feet and over 500 feet, respectively. The International Harvester machine was first in class D with 398.15 points, while the Rumely oil pull tractor captured class E with the highest number of points scored in the contest, 449.75. The Case steam machines won all three events for vehicles of this type, the highest number of points made being 442.85.

The grand prize for best all around performance went to the Rumely tractor of class E, rating over 500 cubic feet of piston displacement a minute. Gold medals were awarded the winners.

RUTENBER COMPANY EXPANDS.

The Rutenber Motor Company, capitalized at \$1,-350,000, has been incorporated at Marion, Ind., and will take over the business of the Western Motor Company, which has been producing Rutenber motors for a number of years. The new capital represents a large investment on the part of George W. Bowen of the Bowen Manufacturing Company, Auburn, N. Y., who is president of the reorganized concern. The business management, as well as the heads of the various departments, will remain substantially in the same hands as in the past, and with the additional finances available for buildings and equipment, the efficiency of the

old organization will be increased to meet the needs of a rapidly growing business.

FIRE CHIEFS AT DENVER.

One of the principal subjects to be considered at the annual meeting of the International Association of Fire Engineers, to be held in Denver, Col., Sept. 17-20, will be the application of motor driven vehicles to fire fighting purposes. A large attendance of fire chiefs from all sections of the United States and Canada is expected. F. J. Connery, chief of the New Castle, l'enn., fire department, will give a paper on "The Triple-Combination Hose Wagon, Chemical and Pumping Engine. Is It a Success?" John Kenlon, chief of the New York City department, and R. H. Bawker, chief of the Passaic, N. L. department, will give papers on "Tractors for Steam Fire Engines, Aerial Trucks and Water Towers," while James Smart, chief of the Calgary, Can., department will discuss "Motor vs. Horse Drawn Apparatus in Heavy Snows."

CONCERNING CARRYING CAPACITY.

Questions relating to the carrying capacity of a given chassis have decided interest for the prospective purchaser of motor trucks. It is a subject which has caused more or less difference of opinion among manufacturers, as well. The following communication brings up some new features, and suggests that a discussion of the matter might prove of benefit to the industry:

Editor, MOTOR TRUCK.

There is a practise among automobile manufacturers to label their chassis with a certain carrying capacity and then sell their chassis with a certain carrying capacity and then sell gardiess of whal kind of a body is placed upon the chassis Now if a chassis in designed and built to carry a lond then there is a very great difference whether or not the load is car-red in a size, body or in a dumping body with its consequent

Tits comment applies especially to trucks of large sizes, particularly five or six-ton irucks.

If a chassis is built to carry five ions then that chassis should not be used to carry over five tons. On the other hand.

if the chassis is built to carry six tons, it should be sold as a six-ton chassis, not as a five-ton chassis.

The practise which the writer believes to be wrong is to

build a chassis, call it five tons and guarantee it to carry a fiveton load, whether the body which is to be placed on this chassis is an open one weighing 156 to 200 pounds, or whether it is a dumping body which will weigh over two tors. If a dumping body weighs 2266 pounds, then such a body put on a five-ton chassis cuts down the load carrying capacity of the truck to four lons and it is an injustice to somebody if this truck is sold as a five-ton truck when its real carrying capacity is only four long, because of the fact that the body weighs a ton.

If the truck really is a five-lon truck then the purchases

who buys this truck and is induced to put on a dumping body who buys his ruck and a induced to paid of a dumping one weighing one ton and capable of carrying five tons, is bothy induced to overload his fruck and such practice is bad. On the other hand, if the chassis is really built to carry six tons, then the purchaser who buys this truck with an open body is paying more money for it than he should pay because he is buying a six-ton truck instead of a five. This practise is all

wrong.

The chassis should be labelled with the actual load that is built and designed for and the weight of the body should be subtracted from this canacity when the actual load carrying capactty is figured. In other words, It is a question of nel gross load carrying capacity and purchasers are being misted every day in this connection

We believe that it would be a good thing for the industry if your paper would start a discussion along these lines. Yours very truly.

MORRIES R. MACHOL. Gen. Mgr., Hydrautić Truck Sales (New York City, July 27.



CHRONA THE RESIDENCE OF THE PARTY OF THE PAR

H. J. Mackenste has Joined the Kelly Motor Truck Company, Springfield, O., as purchasing agent.

The Firestone Tire & Rubber Company, Akron. O., recently opened a branch in Montreal, van.

The Rancel Motor Car Company, Toledo, O., has changed its name to the Toledo Motor Truck Company

The Adams Bros. Campany, Findiay, O., maker of Adams trucks, has opened offices at 68 Broad street, New York City.

The Iniversal Truck Company, Detroit, Mich., recently brokeground for the erection of a \$60,000 service station

The Cinyton Machine Works, Lee Summit, Ma., agent for Flanders delivery cars, is baying a large addition built to its garage.

Arthur Gibbans recently joined the commercial car sales department of the Velle Motor Vehicle Company's branch in Chicago, III.

The American Steam Truck Company was recently Incorporated in Saginaw, Mich., for \$5,00,000. The concern is manufacturer of steam motor trucks.

urer et steam motor trucks. Nauer & Miller, Forl Wayne, Ind., ågenl for Rew Trucks The Pullman Taxicab Company, Philadelphia, Penn. has plans under way for the erection of a new garage to cont approximately 125,000. The building will be 80 by 86 feet, and of freepring construction.

The American Top Company, Jackson, Mich., manufacturer of automobile tops, has merged its business into a stock company with a capitalization of \$350,000, and is considering an enlargement of its plant.

The Merchanta Motor Service Corporation was recently formed in Philadelphia, Penn., with a capital stock of \$100,000. The incorporators are William Vres, theorge B. Tets. George L. Oddy and Nathan W. Bushby.

The American Motor Preight Company was recently incorporated in New York City to do a general motor freight service. The capital is \$25,000 and the incorporators are H. G. Waring, H. W. Bell and H. G. Phillips.

The taple Electric Company, Juy ton, (i.), is meeting with decided success with its Aplew electric lightning system, particularly in the field of delivery warrons for department stores, etc. An accompanying illustration shows a feet of Speedwell ears, main by the Speedwell Motor Car Company of Gayton, emboyed in the delivery service of the Elike-Number Company, and the delivery service of the Elike-Number Company in the Aple of Speedwell ears, made by the Speedwell ears and the Speedwell ears and the Speedwell ears are successful to the Speedwell ears and the Speedwell ears are successful ears are successf



Delivery Equipment of the Rike-Kumler Company, Snyton, D., Fitted with Apico Electric Lighting System.

made by the Rea Motor Car Company, Lansing, Mich., recently occupied a new garage at 17 Stevenson street.

The Dayton Bedy Company, Dayton, O., has purchased a building site upon which a new factory will be erected for the manufacture of automobile holdes of all 15 pes.

The Ford Auto & Tenck Company has been incorporated in Clarendon, Va., with a capital stock of \$25,000. The concern will do a general garage and public service business,

The Kaickerbocker Matne Salea Company has been incorporated with \$10.000 capital abook to take charge of the sales of the Knickerbocker commercial cars in New York City.

The Keystone-Automobile Exchange has been incorporated in Laurenster. Fenn., with a capital stock of \$100,000. The concern will manufacture a line of pleasure and light helivery cars

The "peedwell Mater Cae Company, Daylon, O. maker of the Speedwell line of Irucks, has taken over the San Francisco agency, and has made it a branch. H. Harry Croninger will be the manager.

The White Motors Company, Kaosas City, Mo., has enjered new quarters at 15th street and the Pasen. Agency for the White Ilms of trucks, made by the White Company, Cleveland, O., was taken recently.

The C. & T. Anto Specialty Company, with a capital stock of \$10,000, has been formed in New York City by Genrge F Connelley, John J. Treacy and John R. Hunt for the purpose of dealing in automobile accessories

The Walker Tire Chain Company was organized recently in Toledo, O., with a capital stock of \$150,000. The incorporators are Henry F. Rohrman, Charles A. Newman, Charles P. Eger, A. M. Edwards and George C. Bryce.

The Darwen Motor Truck Company, recently organized in Winnipek, Man., to exploit the Commer truck in Manitoba, has opened permanent quarters in the Imperial Garage, Osborne place that city

Charles D. Schmidt, with headquarters at 416 Broadway, has been appointed sales agent for New York City and vicinity by the Ballwin Chain & Manufacturing Company.

The American Locomative Company, New York City and Dravidence, R. I., maker of the Aleu line of tracks, recently suited the following new dealers to its list. II. T. Rogers, Binghanton, N. Y., Six Thirty-Eight Tire & Vulcanisin Company, Memphis, Tenn. W. II. Ash, Feekskill, N. Y., George E. Storktor, & Musson, Edmonton, Alia, Can., and

The Crosby Company, Buffalo. N. Y., manufacturer of automobile frames and stamped metal goods, is having an addition

made to its plant, 125 by 180 feet. The building will be four stories high and of steel construction.

The Taylor Major for Company, 7125-31 Kelly street, Pittsburg, Penn, has been organized by John Taylor, for the purpose of selling and distributing Lippard-Stewart light delivery wagons in Western Pennsylvania.

Pederal Auto Accessories Company was recently formed in Folumbus, O. by L. R. Luofburrow, H. M. McHonald, W. C. Wetherhold, E. J. Mace and M. L. Mace. The concern will deal in automobile accessories and supplies.

The Timken-Detroit tyle Company is having two large additions built to its plant in DeTroit. That the company has bought land in Toledo, C., for the erection of a plant there, is dealed by members of the firm.

The D. K. & D. Company was incorporated recently in New York City with a capital stock of \$5000 for the purpose of manofacturing motors. The members of the concern are Eckford D McKay, Sidney 3, McKay and Andrew C. Dam.

The Waverley Electric Vehicle Company, Minneapolis, Minnahas been furmed to handle the Waverley line of electric pleasure and commercial cars in that city and vicinity. Temporary quarters have been secured at 1528 Hennepin avenue.

The Kelsey Wheel Company, Detroit, Mich., manufacturer of automobile wheels, is erecting additions to its plant which will about double the floor space of the factory buildings. The new structures will include a main building 18s by 360 feet

H. W. Veager, president of the Yeaker Plano Company, Harlford, Conn., recently look the agency for the complete line The Meter Track Company of Washington, It C. recently secured the agency for the Atterbury truck, made by the Atterbury Motor Car Company, Buffale, N. Y. The concern also has the agency for the Ratfield, made by the Hatfield Company, Emira, N. Y.

The Senton Wheel Compinny was recently formed in Nashtille, Tenn, with a capital stock of \$130,000, to manufacturer all types of automobile wheels. The members of the firm of the Jackson, Samuel S. Lord, R. C. Senton, John T. Landis and J. Ray Boone.

The Wavessier Speing Company, recently formed in Worcester, Mass., has a capital stack of \$25,000. Springs for all types of motor vehicles will be manufactured. The members of the concern are Charles B. S. Jackson, G. A. McKenzle and C. E. Sampson.

The General Motors Truck Company will soon erect a service building at Port and 12th streets and Lafayette houlevard, Detroit, it will be one story in height and have a frontage of 700 feet on each of three streets. The cost will approximate 500.000.

The tieneral Vehicle Company, Long Island Pitty, N. Y., has moved its Chleago office from 417 Ronkery hullding to the slxth dinor of the 10th building, LaSalle and Madison streets. The new office will be in charge of W. W. Witherby, who succeeds P. C. Chrysley.

The Earcha Wolor Car Company, 218-229 Adams avenue, Seranton, Penn, is building an addition to its garage, 85 by 40 feet, this bring mude necessary because of the recent increase in the company's lugitness. The convers has the agency for Speedwell trucks, as well as a line of pleasure vehicles

The White Company, Cleveland, O., maker of the White truck, will open a factory branch in the building formerly occupied by the old White agency, Sixth and Madison streets, Portland, Ore. Charles R. Williams, formerly manager of the Winton branch in Seattle, will be in charge.

I alivered Motor Truck (copung). New York (LI), has been taken over by the parent company in betroit, and in the future will be operated as a factory branch. F. K. Parke of prediction of the New York Fornich, of which H. H. Walton, the former predictal, is vice predictal and general manager. As my sel Mann is creat manager and George Wheeler, assertagy,

The three Weise Naire Company was recently formed in Philadelphia, Denn. to take over the agency in the city and Montgomery county for the Chase Motor Truck Company, Syrachae Compa

at 50th and Washington streets, West Philadelphia.

The General Motors Track Company recently opened a new branch and service station in St. Louis, Mo. O. E. Stoll is in churge as manager.

churge as manager.

Waite's Mater Yans & Surrage Company, New York City, has been incorporated for \$25,000 by Francis T. Germain, Philip J. Punn and Louis Burgess. It is the Intention of the company to do a separal automobile storage business, with particular

attention to motor vana and trucks.

The Keefine Isas Ranjee Cummany has nobled a motor vor repair department to its plant in Kenton, O., and is prepared to do work un trucks as well as pleasure schilets. The company will handle a full line of accessories and will have the septency for Kohish tires. T. A. Taylor is the science many.

The twices Immany was formed recently in Buffalo, N. Y. for the purpose of opening, a sciencer can commercial while garage and salesroom. The officers of the concern the waste of the command of the Magellin. Thomas LaVere, Walter W. Miller, W. H. Rodenhouse, James Fox, Forber Foxter, Fred Haker, Frank H. O'Xelll, James Mora, W. H. Gestz and Horry G. Walter S.

The Newark Auto Teuck Manafacturing Campany has been formed in Newark, N. J. The memities of the concern are L. W. Babbage, H. H. Poole and John T. Walsh, The company will introduce a new motor truck to the trade, to be made in Newark.

Mark E. Funch is urganizing a stock company in North Adams, Mass, for the purpose of manufacturing chains for automobile and truck wheels. The output will be similar to that of the Whitney Manufacturing Company, Hartford, Conn. with which concern Mr. Couche was connected for several years.



Pactory, Buffulo, N. V., of New Stewart Molor Corporation, to Manufacture Light Trucks, of Velle trucks, made by the Velle Motor Vehicle Company, Moline, III. His territory will include Hartford and vicinity.

The Hawkeye Vulcanising Company was formed in Dubuque, in, a short line ago. It is planned to do a general vulcanising lusiness in a building on Fourth street. G. Whitney Williams and Arthur T. Schwaegler are at the head of the concern.

M. W. Evens was recently placed in charge of the truck business of the Locomobile Company of America, Bridgeport, Conn., on the Pacific Coast. Until his promotion he was in charge of the Locomobile company's San Francisco branch.

The Service Recorder Company has been incorporated in New York City with a capital of \$10,000 for the purpose of manufacturing automobile devices. The incurporators are Harold F. Seymour. Frederick Seymour and Benjamin N. Lesy.

The Electric City Specialty Company has been formed in Buffalo, N. Y. with a capital of \$25,000, for the purpose of dealing in automobile specialities and accessories. The members of the tirm are Joseph E. Stark, John H. Beer and Ida E. Stark.

M. Nahors and R. M. Northeutt recenlly took the agency for Alco trucks, made by the American Locomotice Company, Providence, R. L. and New York City, for Atlanta, Ga. and vicinity. They have taken quarters at 233 Feach street, Atlanta.

The Pinns & Henry Hux Track Manufacturing Pumpany, Toleda, C., was recently formed, and has been incorporated with a capital shock of \$20,000. A line of heavy trucks will be placed on the market. The incorporators are A. T. Haynor, W. F. Hunkle and other products.

Warrand by Google

The Devoted to Motor Driven Business Vehicles of All Classes.

VOL. III.

PAWTUCKET, R. L. SEPTEMBER, 1912

No. 9

MOTOR TRUCKS ECONOMIZE ICE HAULAGE.

Providence, R. I., Company Reduces Cost of Supply Service and Utilizes Large Reserves That Had Been Generally Wasted Because of the Expense of Carting-Practical Use of Vehicles Yields Large Returns.

AKING profitable the distribution of thousands of tons of ice that previously was permitted to waste, as well as hauling thousands of tons at a decidedly decreased cost, and largely economizing special and emergency deliveries, the Providence Ice Company, Providence, R. L. has found its power wagon service to be one of the best investments it has ever made. Its installation is not what might be regarded as large, but it has been found to be remarkably efficient.

Not only this, it is the intention of the company to work its trucks and wagons all of the time, instead of by seasons, and it should be understood that from Nov.

The company harvests each year when a full crop is possible, from 200,000 to 225,000 tons of ice, and this is stored in houses in Rhode Island and Massachusetts, some of these being 60 miles from Providence. The majority, however, are within 25 miles. All of these ice houses are located with reference to shipping the ice by railroad and of course it is usually necessary to haul the ice from the houses to the cars, pack it in the cars, and these cars are received at either of the two storehouses in the railroad yards at Providence. As may be imagined, very advantageous freight rates are secured from the railroad company when thousands of tons are shipped each year.



Kissel Faur-Ton Truck in the Supply Service of the Pentidence dee Company, Delivering a Freight to the Burnett Street Station. I to May I it has, as a rule, but partial work for its animals and they are the least productive. It would appear that the horses could be worked without so much regard to productiveness during this period, but the company believes that the trucks and wagons are so much more economical that it would be best to utilize them constantly.

Beginning with the season for general consumption, about May 1, these distant houses are drawn upon, so that these supplies are usually first exhausted, and then as needed the supplies nearer the city are ntilized.

The company is the principal dealer in Providence and it was formed by consolidating several concerns

It has been organized with a view of giving the most complete and economical service possible. Instead of a single point from which to make distribution it maintains no less than nine stations, each of which to a large extent is independent of the other. At the ice house plant at Mashapang pond is a large stable, a blacksmith and wheelwright shop, a harness shop, and large stores of supplies and material are maintained there. Not far from this is the Burnett street station, where about 30 horses are used for delivery; next in importance is Knightsville, in the city of Cranston, where about 20 horses are used; at East Providence and at Ponsegansett in the town of Warwick about 10 horses are in service at each place; at the Ethel street station in Providence eight horses are kept busy, and at the Wanskuck station in Providence seven horses are regularly used. In addition to this is the service from the Mashapaug stable.

at Hughesdale and at North Providence. At Hughesdale are two different plants, known as Upper and Lower Hughesdale, and at North Providence are two that are known as Angell and Swallow. The Hughesdale bourse are approximately four and 425 miles from the Ethel street station and approximately five and 525 miles from the Burnett street station. The Swallow and Angell ice houses are each about four miles from the Harris accuract station and a trifle less than that distance from the Promenade street station.

It was the custom of the company for a number of years to haul the ice from the Hughesdale ice houses to Ethel street and Burnett street, from which a large part of the family trade is supplied, with wagons, occasionally sending loads to the Harris avenue station as well. This work was done by what were known as supply wagons, each having five tons capacity and being drawn by four borses, but because of the character



Pour-Ton Kissel Truck En Route for the Hughesdale Ice Houses for a Lond for the Harris Avenue Station

At Ponsegansett, Knightsville, Mashapang, East Providence and Wanskuck are ice houses where ice is stored, and from which distribution is regularly made. The Mashapang ice is used by packers and for refrigerating only. The ice distributed in the business district of the city is received largely from the houses outside of the city by railroad, and is taken from the houses in the railroad yards at Harris avenue and Promenade street, and from the Barnett street and the Ethel street stations distribution is made to the families. It will be seen that it is necessary to haul all of the ice needed for the last two stations named, and to supplement any demand on the Harris avenue and the Promenade street stations that may be beyond the supply available.

The ice cannot be taken from any of the other stathe time of the men and animals could not be utilize
tions and it is necessary to draw moon the ice houses and was absolutely lost, and it was not possible to em-

of the highways four tons was the normal load and two round trips could be made daily, this making the hanlage of four horses for the day eight tons.

With two trips to Burnett street it will be understood that the mileage was in excess of 20 miles, which was regarded as the limit to which animals could be worked, even with the excellent care given them. With one trip to Burnett street and one trip to Ethel street the mileage was reduced about 11 per cent, but the productiveness of the animals was no greater because no more haulage could be done. The mileage to the Harris avenue station is about the same as to Burnett street. It will be seen from this condition that it actually cost more to haul ice to Ethel street than to Burnett street and Harris avenue, because a part of the time of the men and animals could not be utilized mily was also stilled to some the way and the was also still types or the street than the street and Harris avenue, because a part of the time of the men and animals could not be utilized mily was also still to gen.

ploy them in other work. Yet these stations, at least all but Harris avenue, could not be supplied with ice from any other source with less expense, and so it was necessary to haul it over the road. As might be imagined, it was necessary to have a number of wagons in this work, and allowing a price of 87 a day for four horses, a cart and a driver, which is less than the cost for such an outfit to the average ice dealer, this would make the expense of haulage of ice approximately 87.5 cents at no for either a four or five-mile haul, or, based on ton miles, the cost would be 21.875 cents for four miles and 17.5 cents for five miles.

While it was necessary to have this ice it will be understood that the cost of haulage was at least equal to and often times in excess of the expense for ice taken from ice houses in the country and shipped by railroad, not considering excessive shrinkage. That is, aside from the cost for hauling and hauling in ship-

be necessary to supply their customers, and it is not unusual in hot weather for the men to take out as many as three and sometimes four loads. Where the ice is available in the houses it can be taken out as required. but where the supply must be hanled, as at the stations named, it is necessary to have the supply service prompt and certain. Naturally, in the weather when the demand is the greatest the largest quantity must be hauled, and at such a time the work is more severe on the horses and men as overtime is necessary to keep up with the distribution. But no matter what the expense or the strain upon the animals the work must go on. In the extremely hot period of 1911 the company lost a number of horses simply because it had to work them to excess. The delivery service is. of course, worked under a corresponding pressure under such eireumstances.

This season the company has in service three trucks



Five-Ton Mack Truck, the First Machine Employed in Regular Hanings by the Providence Ice Company,

ping the ice, with the price established for large haulage, the ice, unless there was large shrinkage, could be placed in the carts for delivery cheaper than the Hughesdale crop. Not only this, the cost of haulage from the Angell and Swallow ice houses was approximately the same to Harris acenue as from Hughesdale to Ethel street, and to haul this ice to the Ethel street and Burnett street stations would cost so much that it was regarded unprofitable to handle it, unless in the event of an emergency. Each year the houses were filled, but this was merely a reserve in the event of a shortage, and in some instances ice is kept for several years, or mutil it became practically a solid mass and was broken out with explosives, or nemtited to melt.

With the different stations of the company it is always practical for the drivers of carts to return to that to which they are attached and secure whatever may and a 1500-pound delivery wagon. These trucks are now engaged in haulage from the Hughesdale house to the Burnett street and Ethel street stations, with occasional trips to the Harris avenue station and making wholesale deliveries. They are doing the work of at least eight four-horse teams and wagons, and the delivery wagon is doing at least the work of three single horses and carts, so that the four vehicles are doing what would require approximately 35 horses, considering there would be need of spare animals, and that the animals were worked to their capacity.

The company is using two KisselKar trucks of four tons capacity each, a KisselKar delivery wagon, and a Mack truck of five tons capacity. These machines are working on the Hughesdale haul now, and will continue until the supply at these houses is exhausted. Then the supply at North Providence will



The 1500-Pound Kissel Dellvery Wagon I sed for Special, Emergency and Sunday Service.

be drawn upon. One of the KisselKar trucks is making five round trips three days of the week and six round trips three days of the week, or 33 loads of four tons each, this machine being driven from 60 to 65 miles daily. The other KisselKar is averaging five trips a day, or 30 four-ton loads a week. The third truck is hailing on an average of five trips a day, five-ton loads, although this is frequently broken to take care of wholesale deliveries. This applies to regular work and not to overtime requirements.

Considering this work for a moment, it will be understood that the first truck is doing the haaling for which 2.75 four-horse teams would be needed, the second is doing what would require 2.5 four-horse teams, and the third what would necessitate 3.25 four-horse teams, or 8.5 teams all told, this

alone calling for 34 horses daily and nine drivers. Allowing the expense of operating the trucks to be \$12 a day, and figuring the cost of a four-horse team. wagon and driver at \$7, it will be seen there is a material economy, for the horses would cost \$59.50 as against \$36 for the trucks, and by this the cost is reduced from 87.5 cents a ton to 54.5 cents a ton, while the shrinkage is reduced from five per cent, with horses (average), to one per cent, with the trucks

The figures stated for horse only to this company, for it maintains its equipment with great economy. The horses may be averaged in price at \$379, a wagon at \$300, a set of

harness at \$75, making the total cost of a supply wagon outfit about \$1850, and the daily cost of keeping the horses and paying a driver \$2.25 a day is estimated at \$7. The company has its own facilities for building and repairing its wagons, doing its own blacksmithing, painting, harness repairing, horseshoeing, and it purchases its materials and supplies in large quantities, saving from every angle, while it keeps its labor expense at a correspondingly low figure. So the trucks are placed against the lowest possible horse cost. The company depreciates its horses at 20 per cent, a year. This may be varied from, for horses have

been used for 20 years, but five years is a reasonable period of service for animals,

Relative to the use of horses it has been found that they last much better in cart delivery work than in the long hails, because they have intervals for rest, and while the work may be a good many hours a day for a part of the year, it is not as hard as when they have to do steady pulling. The experience is that after the season's active work the horses have a chance to rest, and then they are sent out for the ice cutting, which may be from nine to 12 weeks. During the actual cutting the horses are worked sometimes 18 hours a day, because of necessity, and at the end of the winter they are well used up and need all the time permitted for them to recover their strength and spirits. So



The Finely Equipped Repair Shop Unintained by the Providence Ice Company in Connection with its Motor Wagon Department.

while there may appear to be a long time when the animals are not worked hard, as a matter of fact they have to have the rest to endure in the service. And what may seem to be a surplus of horses after the summer season has passed cannot be disposed of. Good horses are too difficult to get and good ice delivery animals are especialty valuable.

When the Hughestale ice houses have been emptied the North Providence houses will be drawn upon. It will be seen that with practically the same hand as from Hughestale to Burnett street and Ethel street, and with an eight-mile round trip from Harris avenue, the cost of haulage with horses was practically prohibitive, but with the trucks this ice can be hauled with the same reduction of cost as from Hughesdale.

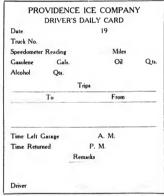
The 1500-pound KisselKar wagon is stationed at the Harris avenue station to make all sorts of special trips and emergency calls, carrying from a full load to a few cakes. Usually it is in service from 8:30 to 7 daily, but Saturday nights it is worked until 11 at night. It serves from 20 to 70 customers a day, and Sundays it is utilized to make from 20 to 25 deliveries. It does more than the work of three single wagons. When sent on emergency calls the driver frequently telephones the office and is given orders received after he began the trip, and in this way economizes time and increases the efficiency of the service. Sometimes it costs the company 50 cents to deliver a 10-cent piece of ice, but it has been possible to attract customers by quick service that compensates for this many times. Not only this, there is considerable economy in the time of the men who might be compelled to make long trips with horses, or lose time delivering special orders.

The company experimented with a truck last year. buying the Mack five-ton machine. This was worked with horses in the Hughesdale haul and at the end of the season. Nov. I, careful account was made of the work that it had done and the cost of this contrasted with the cost of this haulage by horses. It was found, after allowing depreciation at the rate of 20 per cent., the truck had saved \$1100, not considering that there was a reserve capacity that was superior to animals, not estimating the value of this reserve in the particular work in which it was engaged, not considering the saving when the machine was withdrawn from service, a matter of at least \$10 a day, not computing the saving in ice shrinkage, not regarding the accommodation to customers, and not accounting for the depreciation in animals or the cost they would represent.

It was upon this practical demonstration that the company purchased the KisselKar trucks, which were delivered to it early in May, and which have been in actual service daily since then. Because of the contract under which the machines were beapth and the contract made for tires it is impossible to state maintenance and upkeep charges, but the tire cost is estimated on the basis of the guarantee.

The company has its garage at Burnett street, where it has a well equipped repair shop with a high class mechanic in charge. He is expected to maintain and repair the trucks and machines, there being a Buick errand wagon and two pleasure cars that are used for the company's business, and when a driver is unable to report he takes the man's place temporarily. He is given whatever assistance may be necessary in his work. The shop has a fine lathe, a shaper, a drill press, an arbor press, a grinder and a forge, and the power is an electric motor. Stock and materials are kept on hand for making any part that may be necessary and of course there are the usual band tools.

The garage is in charge of a watchman at night, and he washes the machines and makes the repleuishments of gasoline and oil, so that the machines are ready for the start in the morning. Each day each driver fills in a card, an example of which accompanies this article, which gives every information of his work. The



Providence Ice Company's Driver's Daily Report Card, Printed on Manila Card, Eight by 3.5 Inches.

loads are not weighed, but each driver is expected to carry the capacity of his vehicle, and no more. If the trips are not what is demanded by the service an explanation is necessary. These cards are filed and it is possible to learn at any time what was done on any day and for a specified time. The distances have all been established by an odometer record and are accurately known.

In working the trucks the driver has no helper, but there are helpers at the place of loading and unloading and the arrival and departure of the machines are so timed they are at no place together. While the trucks are absent the helpers are engaged in other work, so no time is lost. This is decided economy compared with the helpers riding about on the trucks and working but a part of the time.

WHAT IT COSTS TO MAINTAIN HORSES.

That those who are depending upon horse drawn equipment have no accurate means of knowing just how much it costs for haulage has been evident ever since motor truck salesmen began trying to interest business men in the economy to be secured through the use of the mechanical transport. To illustrate: It may be cited that some of the oldest and shrewdest men in the drayage business in Boston have been letting out a driver and pair of horses, with all the necessary paraphernalia, for 82 and \$7 a day, while those who made a charge of \$10 were considered as among the grassing.

In an effort to learn just how the matter stood the Team Owners' Association of that city recently invited W. H. Jarvis of Jarvis, Crawford & Co., a certified public accountant, to address its members upon the subject of horse maintenance, the facts being gleaned from his experience in going over the books of concerns operating fleets of horse drawn vehicles.

Mr. Jarvis brought out some facts very clearly, To start with, there are 36 or 366 days in the calendar year, and the horse, taken as a unit, must be fed, housed, maintained and cared for during each day, although to get its earning capacity, excepting the unusual occasions of a few Sundays or night work, there should be a deduction of 52 days and nine for holidays, a total of 61, leaving 304 effective days. This is actually a reduction of 160 per cent, or one-sixth.

Taking for example an installation of 200 horses, there must be from four to six animals for the use of managers and foremen in properly directing the work, and there must be spare horses for use in case of sickness or accident. Mr. Jarvis suggests that 20 is a liberal estimate, and that gives 10 per cent, of unproductive horses. Thus it is that the actual efficiency of the animals is reduced to 75 per cent.

He finds that it costs at present \$19.87 a month to feed a horse, making a total cost of \$8.974 a month for the 200 horses. Since there is an efficiency of only 75 per cent., Mr. Jarvis gives the daily feed bill of a horse as 90 cents, whereas as a matter of fact one horse eats but 66 cents worth according to his figures. Other items in the table below are computed accordingly:

Single	Double
Tenm.	Team.
Driver's pay\$2.00	\$2.50
Feed	1.80
Rent and stable	.62
Shoeing and small repairs	.38
Claims, accidents, tolls, etc	.26
Foremen and helpers, pro rata	.26
Other helpers	.40
Repairs, harness and painting13	.26
Manager or superintendent, salary10	.20
Office rent, telephone, clerks	.62
Miscellaneous, veterinary, etc	.48
Fire and accident insurance	.16
Depreciation	.40
Totals \$5.00	28.54

Three leading merchants in Minneapolis, Minn., have demonstrated the advantage of a co-operative delivery system in which six KisselKar trucks, made by the Kissel Motor Car Company, Hartford, Wis., play a prominent part. One of these machines makes five calls daily at each of the stores, collecting the packages and taking them to a central distributing station, at which they are sorted and assigned to the five others, each of which makes three delivery trips daily. The cars are manued by a neatly uniformed driver and assistant, and it is said that the cost of delivery under this system is about half of that under the old arrangement with horses.

LOAD RATING AND CHASSIS WEIGHT.

Interesting Compilation Showing Average with 329 Gasoline and 49 Electric Vehicles.

The subject of load rating and chassis weight, and their relation to each other, is one which is being given serious consideration by both manufacturer and owner. In order to arrive at some definite result as to what has been accomplished along this line, the commercial vehicle committee of the National Association of Automobile Manufacturers has prepared the accompanying table, which sets forth the various load capacity ratings as supplied by the makers of 325 gasoline and 49 electric commercial cars.

For example: The average of the chassis weights of 49 differem makes of three-ton gasoline wagons is 5509 pounds. To bear a uniform relation to the average weights of all other capacities the weight should be 5600 pounds. But the average of actual weights of 10 well known and successful makes of three-ton trucks is 6700 pounds, which exceeds the average of the 49 by 470 pounds. The table follows:

Gasoline Vehicles.

				Average
				weight
	No. of		Means of	of 3 to 10
Capacity	models	Average actual	all chassis	leading
rating.		chassis weight.	weights.	makes.
(Pounds.)	on.	(Pounds.)	(Pounds.)	(Pounds.)
500-800	11	1,221	1,200	1,272
1,000	2 2	1,786	1.780	1.728
1.200	10	1,880	2,000	2.211
1,500	34	2,190	2,490	2,331
2,000	46	2,986	2,900	2,230
2,000	20	3,727	2.750	3,536
4,000	4.4	4,505	4,500	4,721
5,000	4	5,125	5,050	5.233
6,000	49	5,509	5,600	6,070
7.000	10	6,080	6,100	6,100
8,000	16	6,423	6,550	6,500
9,800	2	6,281	7,000	
10,000	32	7,602	7,400	8,222
11,000	1	7,800	7.750	
12,000	4	7,920	8,150	
13,000	2	8,966	8,550	
14,000	2	8,700	8,960	8,700
15,000			9,200	
18,000			10,500	
20,000	3	11,240	11.250	9,860
	1	Slectric Vehicles.		
500-800	7	2,275	2,275	2,540
1.000	11	2.755	2.750	2,700
1,500	2	3,518	3.200	3,250
2.000	1	3.525	3,800	3,716
2.500		4.270	4,300	
3.000	2	4.124	4.750	
4.000	6	5,592	5.600	5,439
5,000			6,250	
6.000	1	7.000	6,900	7,000
7.000	4	7.439	7,400	7,851
8,000			7,850	
10,000	3	8,438	8,700	8,435
12,000	1	10,000	9,500	

PEERLESS FOR PORTO RICO.

Interesting Body Equipment to Be Utilized Instead of Trolleys in the Vicinity of San Juan.

Three three-ton Peerless truck chassis, made by the Peerless Motor Car Company, Cleveland, O., will take the place of a trolley service in the environs of San Juan. Porto Rico, the Peerless Motor Car Company of England, with headquarters in Boston, having delivered the order during the past month. An accompanying illustration presents one of the vehicles, all of which are fitted with 30-passenger bodies. The chassis is painted bright yellow with black stripings, but the woo-dwork is all finished in oil on the natural wood, since it has been found that this treatment withstands the climatic conditions of Porto Rico better than the usual paint and varnish finish.

The seats are furnished with removable spring cushions, covered with rattan. There are five of full

terminus and Dawson, during the closed season along the Yukon river. This line has required the services of between 350 and 500 horses and a large number of men to operate it successfully. Recently, the management purchased a two-ton-Knox truck, made by the Knox Automobile Company, Springfield, Mass, and although the trail is decidedly rough and with many steep grades, the car gives every indication of being the forerunner of the complete motorization of the line.

INTERESTING TIRE TEST.

An Effort to Determine the Type Best Adapted for Service on Light Delivery Wagons.

A series of tests to determine the average length of life of three standard types of tires on light delivery trucks recently was completed by the engineers of the Motz Tire & Rubber Company, Akron, O., the trials



Three-Ton Peerless Chassis Filled with Special Body for Passenger Service in San Juan, Porto Rico.

width back of the driver's seat and two shorter scats in the baggage compartment at the rear. The top is somewhat similar to that of an open street car, and is furnished with pantasote curtains mounted on spring rollers and running on wire grooves supporting the roof. This provision makes it possible to enclose the passengers completely during a sudden shower. The two running boards on each side are arranged to fold up out of the way when not in use. The dash is equipped with a large swivel searchlight, and a hand operated siren horn.

The motor truck is slowly but surely finding its way into every corner of the civilized world, and one of the latest sections in which the commercial vehicle is being tried with success, is Maska, which only a few years ago was considered a wilderness. Ever since the construction of the White Pass & Yukon Railroad, a stace line las been maintained between the northern

extending for a period of several years. Cars in the service of some of the largest retail houses in the country were utilized for this purpose, and the tires employed were solid rubber, pneumatic and the special cushion type made by this company. The trucks were divided into relays, each type of tire being utilized in the same order on each. That the firms represented by these cars have since adopted the Motz cushion tire appears to be sufficient evidence that the tests were most convincing.

It is claimed by the company that the result was a druble victory for the Mott trie, in that it was found that these so conserved the mechanism of the machines that breakage of parts in all tests amounted virtually to nothing. It is further stated that the tests showed a substantial saving in the cost of tire equipment, covering the long time period of the experiment. Additional and specific data are promised in the near future, and will be awaited with lutterst.

NEW STEWART LIGHT DELIVERY WAGON.

THE Stewart Motor Corporation, Buffalo, N. Y., has placed in the market its first production, which is a chassis having a load capacity of 1800 pounds, this being fitted with six different types of bodies as standard equipment. The wagon is offered as a high grade machine, having every desirable quality so iar as design is concerned, and the material and workmanship are maintained to be the best that is obtainable

The Stewart Motor Corporation is a new organization, but it is composed of men who have been to ralong time identified with the industry. The president and general manager is T. R. Luppard, R. G. Stewart is vice president and chief engineer, R. P. Lentz is secretary and treasurer, and Robert W. Ingersoll is sales manager, Of these men Mr. Lippard and Mr. expected to meet the requirements of a very large class that can use a comparatively fast wagon, that will have limited capacity and be enduring and economical in its operation.

The proportion of lusiness men whose delivery is over a considerable area is very large indeed, and it is necessary that they be as prompt in their service as their competitors. The Stewart wagon is designed to carry boals up to its capacity at speeds that are permitted by laws and local regulations, and with an economy that is marked when the work is considered. The purpose was to build a vehicle that would be simple in its construction, with sufficient margins of safety to insure endurance, and with power adequate for all requirements, while its cost of operation and mainte-



The Stewart Light Delivery Wagon, 30 Horsepower, Fitted with a Special Express Body, Baving a Capacity of 1500 Pounds.

Stewart formerly were the promoters, organizers and the executives of the Lippard-Stewart Motor Car Company, which is located at Buffalo; Mr. Lippard being vice president and general manager, and Mr. Stewart the chief engineer. That company was formed for the purpose of building light delivery vehicles from designs made by Mr. Stewart, and it became widely known from the general character of the wagons manmiactured.

Previous to this connection Mr. Lippard was general manager of the Fraukin Antonobile Company, and Mr. Stewart was connected with the same concern in an engineering capacity, and before that he was of the engineering staff of the Oble Motor Works, and of other companies. From those associations it will be realized that Mr. Lippard and Mr. Stewart have had wide experience, and with their knowledge of the demands of the people have built a type of vehicle that is

nance would be comparatively small.

When the Stewart Motor Corporation was organized its product was decided on and much care and attention was directed toward perfecting a machine that would be in every way satisfactory, and after a period of experimentation the Stewart wagon was dievel-ped to a state where it was ready for the market, with the guarantee of the maker that it would be in every way a thoroughly dependable and reliable vehicle. It is claimed for the wagon that it is big, roomy, high grade in every detail of construction, and that it has more desirable standard qualities than any other vehicle offered in the market irrespective of price. It is also maintained by the maker that the machines are so well built that they should be serviceable for an mursually long period.

The factory organization is complete in every respect. The plant is large and has been equipped with ample machine tool facilities, the workmen are well trained and thoroughly experienced men, and it is expected to build the machines in large numbers. The



The Hight Side of the Motor of the Stewart Belivery Wagon Chasala.

initial shipments will be begun carly in September and with a standardized vehicle the production ought to be large. It is not expected to produce yearly models. It is believed that it is best to concentrate on one type of chassis and to add to it whatever may be regarded as desirable whenever a perfection has been found to be practically worth while.

In the design of the Stewart wagon it was Mr. Stewart's purpose to produce a vehicle that would be simple from every point of view, and with the units so arranged that they would be easily accessible and quickly removable, that the time for making examination or restoration might be minimized whenever work was necessary, and the cost of labor economized. While a comparatively light wagon it was proposed to have the highest degree of endurance and to insure the largest measure of service.

The motor selected is a Continental production of the vertical 1, head, four-cylinder, water-coded type, with a bore of 3.75 inches and 5.25-inch stroke. This engine is rated at 22.5 horsepower by the S. A. E. formula and as the bore to stroke ratio is 1 to 1.40 it will be understood that the claim of 30 horsepower made for it is conservative. This is regarded as being ample for the bardest service that could be required of a wagon of 1500 pounds capacity. The motor is in every way simple and compact.

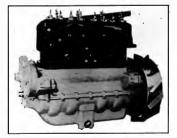
The four cylinders are east en bloc from a fine quality of gray iron with the water jacket integral, the top of the water jacket being open so that it is possible by a special process to thoroughly clean the jacket, insuring against fins, core wire, core sand or any other obstruction, and having the spaces free for the circulation of the cooling liquid. The head of the block is a cast plate in which is incorporated the water outlet manifold and this outlet gradually rises at the rear of the block, a deep channel directing the movement of the water from the front of the motor to the manifold connection. This plate is retained to the block by a

series of cap screws and a water tight joint is obtained by a gasket. The valves are at the left side of the motor.

After the cylinder block is bored it is aged, then reamed and ground to size and polished. It is admirably finished. The pistons are of the same material as the cylinder block and are carefully turned and ground to size. They are five inches length. The pistons are channelled for four diagonally split eccentric expansion rings, and these rings are ground on the edges and peripheries. In each piston are five grooves that collect the lubricant and insure lubrication. All of the pistons are carefully weighed and balanced.

The crankcase is constructed in two sections of a high grade nickel aluminum alloy and it is unusually strong. The upper half carries the main and the camshaft bearings, and the lower contains the oil reservoir and the means for distributing the lubricant. There is a large drain outlet in the bottom for the purpose of cleaning the oil container. The sections are extended forward beyond the web and these extensions, when closed with a plate, house the timing gears. The bottom section has a transverse horizontal web dividing it, and in this web are the four oil channels or pits into which the connecting rods sweep. The upper section has four arms cast integral at the front and rear which support the motor in the chassis frame, At the right side is the bracket that supports the water pump. There is a patented breather pipe that reduces the crankcase compression and minimizes the heat. This also serves for a filler for lubricant.

The crankshaft is a .35 to .45 carbon steel drop forging that has a tensile strength of 90,000 pounds to the square inch that is carefully hardened, heat treated and ground. It is 1.75 inches diameter and it is ear-right on three main bearings, the front bearing being 2.75 inches length, the centre three inches and the rear



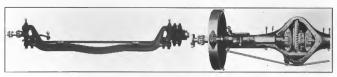
The Left Side of the Motor of the Stevart Delivery Wagon Chanala.

four inches, this being a total of 9.75 inches of bearing surface. Both the shaft and the crankpin bearings are carefully ground to size. The shaft is flanged to take end thrust. The bearings are high grade nickel babbitt and after these are fitted they are extended on special extension arbors and are reamed and hand scraped. They are retained by brass retaining screws.

The connecting rods are I section steel drop forgings that are heat treated to secure full strength. They are 10.5 inches length and carry big end bearings 2.5 inches length. These are fitted with nickel babbitt bearings and the big end caps are retained by special nickel steel bolts that are retained by a locking device. Being fitted with sheet steel shims the bearings may be accurately adjusted for wear. These are fitted as are the main bearings. The wristpins are of liberal size and the bearings are of nickel babbitt. The camshaft is drop forged from a low carbon steel with the cams integral. It is carefully ground, hardened and heat treated. It is 1.0625 inches diameter and it is carried on three bearings, the front, middle and rear journals being 2.3125, 1.5 and 1.25 inches length, respectively, these being of nickel babbitt. The construction is such that it may be removed in a short time by taking off the gearcase cover at the front.

The timing gears are of large diameter and wide face and are belical cut to prevent noise. These include the crankshaft, camshaft, idler and pump shaft ried back to the reservoir and again circulated. The water is circulated by a large centrifugal pump driven by an outside shaft at the right side of the motor. The pump has unusually large bearings and the stuffing boxes are also of a size to insure long endurance. The radiator is of the flat tube type and is located at the dash on coiled springs, this preventing damage from road shock. Air is circulated through the radiator by a series of blades carried on the periphery of the flywheel. The ignition is by a high-tension magneto with fixed spark, this simplifying the system, minimizing the wiring leads and the connections, and insuring against any complication. Besides this, with the fixed spark there is little possibility of the motor being abused. The carburetor is an automatic float feed type that is maintained to afford a perfectly satisfactory mixture under all operating conditions,

The clutch is a multiple disc type in which II plates, nine inches diameter, are used, five of them being faced on either side with Raybestos and fitted between the other six discs. The clutch is positive and easy in engagement. It may be removed by taking off the front cover and the double universal joint between the flywheel and clutch. The clutch case is integral with the transmission gearset case and is a nickel alumn.



The Front and Bear Axle Construction of the Stewart Light Delivery Wagon.

gears. The valves are large and have ample clearance to insure effective clearing of the exhaust, and to secure full charges of fuel. The valves are interchangeable and have nickel steel heads electrically welded to carbon steel stems. The valve seats, valves and the stems are accurately ground to size. The ends of the valve stems are hardened to minimize wear. The springs are large and well tempered. The valve tappets are of chrome nickel steel, of the nushroom type, case hardened, with heads and stems ground to size. There is an adjustment for wear. The valve mechanism is enclosed in compartments formed by side webs with cover plates retained by winged thumb nuts.

The intake manifold is integral with the block casting and there is a short riser by which the carburetor is connected. The exhaust manifold is a separate casting, and it is so formed that it does not in any way obstruct work on the valve mechanism.

The engine is lubricated by a pair of plunger pumpthat are operated by an eccentric on the camshaft. The oil is pumped through a system of tubes to the rear main hearing and the timing gearcase, and the drainage is into the oil pits in the crankease, where the oil is thoroughly distributed by splash. The excess is carimm alloy. The gearset is a selective type, a Brown-Lipe construction, and the gears and shafts are 3.5 per cent, nickel steel, double heat treated. The shafts are carried on Timken roller bearings throughout. There are three forward speeds and reverse. The shafts are fitted with stuffing boxes to prevent leakage of oil.

The driving shaft is of high quality steel 1.25 inches diameter, and it is constructed with a universal joint at either end, to prevent possibility of misalignment. The rear axle is a Timken full floating construction, with a pressed steel housing shaped like the truss of a bridge. The housing is reinforced with sleeves at the outer ends, these sleeves supporting the spring seats and the weight of the machine on the wheels. The differential gears are large and are mounted on Timken roller bearings, while the wheels are fitted with similar bearings. The ratio of the differential is five to one.

The forward asle is a heavy I section with the pivots and the wheel spindles fitted with adjustable Timken roller bearings. The tail lever is a steel drop forging. The tiebar is located behind the axle for protection.

The frame is a high carbon steel channel section

ward and 34 by 4.5 at the rear.

that is 4.5 inches deep at the centre and tapered toward the ends. In this is mounted a sub-frame on which the motor is mounted. The front springs are 38 inches length and two inches width, of special analysis steel carefully heat treated. The rear springs are similar material, 50 inches length and 2.25 inches width. The wheelbase is 126 inches and the wheels are fitted with 12 spokes, 1.625 diameter front and 1.75 inches diameter rear. The tire equipment is 34 by four-inch for

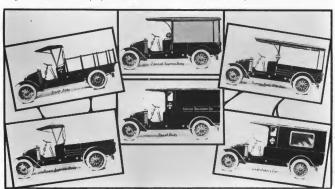
The control is by the conventional pedal for the clutch and for the service brake, with throttle lever on the steering column above the wheel. The steering wheel is located at the left side. The steering gear is a worm gear type, with a worm of bardened steel, ground to size. The worm wheel is of hardened steel, integral with the shaft. Ample provision is made for

MAIS COMPANY REORGANIZED.

Wheeler of Wheeler & Schebler Secures Controlling Interest in \$1,000,000 Concern.

The property of the Mais Motor Truck Company, Indianapolis, Ind., maker of Mais trucks, which had been in the hands of a receiver since July 12, was purchased Aug, 19 by Frank H. Wheeler of Indianapolis, and Walter N. Pearce and H. G. Francis of Rushville, the purchase price being \$71,000. In addition the new owners assume a mortgage of \$10,000 on the plant.

Immediately after the approval of the sale by the court, the Mais Motor Truck Company was reorganized with capital of \$1,000,000, the new officers being as follows: President, Frank II, Wheeler, who owns half of the stock: vice president, Walter M. Pearce:



The Six Types of Body Furnished as Standard Equipment with the Stewart Light Delivery Wagon.

adjustment for wear. The speed changing and the emergency levers are in the centre above the gearcase. There are two brakes, the service member being internal expanding and the emergency brake external contracting on drums on the rear wheels.

Unusual care has been taken to insure lubrication of the spring bolts are fitted with large grease cups, the pedal and brake shafts have grease cups placed outside of the frame where they can be easily filled, and the steering gear is well lubricated.

The wagon is fitted with either express body, panel body, open hox body with cape top, special express body with wire grating, a stake platform body and an undertaker's body. The usual equipment is furnished with any one of these bodies, and is complete in every respect.

secretary and treasurer, Alvin S, Lockard, Indianapolis. Will H, Brown, formerly president of the company, is expected to remain as general manager. The other directors are Jacob V. Stimson of Huntingburg and Harry G, Francis.

FLANDERS TO ENTER FIELD.

Detroit Rumor Suggests the Production of a Worm Driven One-Ton Machine.

Coincident with a rumor that Walter E. Flanders, formerly president of the E-M-F Company, Detroit, and subsequently vice president and general manager of the E-M-F plants of the Studelaker Corporation, has resigned to devote his entire attention to the Everitt Motor Car Company, Detroit, and the Flanders

Manufacturing Company, Pontiac, in both of which he is financially interested, comes the statement that he will soon enter the commercial vehicle field with a Filanders truck.

It is understood that the new model will be of onetion capacity, and that it will embody several new icatures in design. The motor is to be a four-cylinder unit, and the particular feature will be the worm driven rera aske. This is to be offered in a number of differing body types to meet the various requirements of the purchasers.

APPOINTED SALES MANAGER.

Frank A. Groves to Be Held Responsible for Success of Speedwell Trucks.

Frank A. Groves, who is widely known in the automobile industry, has been appointed sales manager for the Speedwell Motor Car Company, Dayton, O.,



in a ke'r of Speedwell pleasure and commercial cars. This information will be received with pleasure by a large number of people who are person ally acquainted with Mr. Groves, particularly in the Middle West.

Like a number of other successful men in the sales end of the industry, Mr. Groves is a graduate from the sales department of the National Cash

Prank V. Graves, Sales Mannaer, Register Company of Specialvell Motor for Company. Day von. After 14 years with that concern he found himself with the financial means to assume an interest in the Chicago agency for Specdwell cars. That was nearly five years ago, and since that time he has had direct charge of the sales of these vehicles in the Chicago territory. His present appointment therefore comes in the nature of a well descreed promotion.

ANOTHER THREE-WHEELED CAR.

Minute Man Tri-Car to Be Manufactured by Newly Organized Company in Middletown, N. Y.

The Industrial Motor Car Company, Middletown, N. Y., has been organized with capital of \$35,000, for the manufacture of the three-wheeled commercial vehicle to be known as the Minute Man tricar. The officers are: President, William G. Richardson; vice president, Waite M. Cotton; secretary and treasurer, Robert M. Bagg.

The plant formerly occupied by the National Saw Company, which recently removed to Newark, N. J., has been acquired, and alterations are now in progress. The car will have a two-cylinder opposed motor of 16 horsepower, two-speed planetary transmission, 86-inch wheelbase, and a variety of bodies to meet the individual requirements of the purchaser.

MARMON TRUCK ANNOUNCED.

Well Known Manufacturer of Pleasure Cars Adds Light Delivery Wagon to Its Line.

Coming somewhat in the nature of a surprise to the industry, the Nordyke & Marmon Company, Indianapolis, Ind., announces the production of a light delivery car with carrying capacity of 1200-1500 pounds. It is stated, however, that the concern has been engaged in experimental work for some time past, and that several of these machines have been used with satisfactory results about the Marmon plant for several months.

The motor is the same as that utilized in the 32 horsepower Marmon pleasure car, except that the bore has been reduced from 4.5 to four inches. Naturally, the entire assembly has been strengthened throughout. One or two new ideas in truck construction are evidenced, among them being the policy of fitting dual pneumatic tires to the rear wheels.

THREE-TON MODEL COMING.

Well Known Men Interested in Standard Company Now Being Organized in Detroit.

Howard Wilcox, for some time past connected with the Kelsey Wheel Company, and W. K. Ackernan, formerly assistant manager and purchasing agent for the Reliance Motor Truck Company of Owosso, Mich., are among those interested in the organization of a new commercial vehicle company in Detroit. This will be known as the Standard Motor Truck Company, which has been incorporated for \$50,000.

A factory has been secured at 975 Bellevue acenue, and the work of production will be begun in the immediate future. The vehicle is to have a capacity of three tons, and will be of standard construction throughout. The motor will be a Continental.

SCHACHT WORM DRIVE MODEL.

Still Another Pleasure Car Maker Expected to Announce a One-Ton Truck Soon.

It appears that the Schaelt Motor Car Company, Cincinnati, O., which has been engaged in the production of pleasure cars for a number of years, is soon to enter the commercial vehicle field, with a one-ton truck of distinctive design. It is stated that the concern has been engaged in experimental work for the past two years, and that the product is now about ready to be placed upon the market.

In many respects the construction of the new car is espected to follow standard practice, but a feature which seems to indicate a trend of the times, particularly as a number of makers have amounted or are ready to amounce the adoption of this type of drive, is the utilization of a worm driven rear axle. Another feature will be the use of pneumatic tires in front and solid in the rear.

NEW DEPARTURE BUSY.

Increased Demand for Its Product Makes Necessary the Erection of New Buildings.

As a result of recent tests made by some of the leading American ear manufacturers, the factory of the New Departure Manufacturing Company, Bristol, Com., maker of New Departure ball bearings, is one of the bussets places in the industry. All departments are working 127 hours a week and some of them 152, with night and day shifts of skilled mechanics.

It is stated by officials of the company that this remarkable condition is assured for weeks to come, the contracts for 1912 and 1913 delivery having been increased nearly three times over those for 1911. In order to take care of this increase in business additions to the factory have been planned, which when completed will give nearly 75,000 square feet of floor space. It is anticipated that this will be available late this fall.

JONES SPEEDOMETER EXPANDING.

Demand for Commercial Instruments Has Impelled the Addition to Its Plant.

To meet the greatly increased demand for its product, the Jones speedometer, recorder and hub odometer, the Jones Speedometer Company, New Rochelle, N. Y., has secured additional manufacturing facilities in the Bush Terminal, Brookley, N. V., where the factory space will more than treble that occupied heretore. The New Rochelle factory will be continued at its full capacity.

Oct. I the commercial vehicle instrument shipping department, now at Canal place, New York City, will be removed and consolidated with the specdometer service station in the Speedometer building. Broadway and 76th street. This will have the effect of still further increasing the shipping facilities of these instruments.

MIDSUMMER TRUCK SHOW.

Manufacturers to Have Opportunity to Express Themselves Regarding This Plan.

At the recent meeting of the executive board of the National Association of Automobile Manufacturers at the summer home of General Manager S. A. Miles,

Christmas Cove, Me., the matter of holding a midsummer truck show in 1913 was discussed at some length. The sentiment of the meeting was about equally divided, and the secretary was instructed to secure the views of the various manufacturers concerning the proposition.

Albert Pope, chairman of the traffic committee, reported progress in the matter of freight rates and also on insurance of motor trucks. He amounced that the Automobile Underwriters' Conference was considering the reclassification of rates on commercial cars, it having been developed to its satisfaction that the fire hazard is greater while the truck is on the road than while in the garage.

LATEST GRAMM DEVELOPMENTS

Another Official Leaves for New Concern and Willys Brings Suit Alleging Fraud.

The recent purchase of the Gramm Motor Truck Company, Lima, O., by John N. Willys, president of the Willys-O v e r-

land Company, Toledo, O., has been in followed by a general exodus- of the old officials of that concern to join B. A. Gramm in the formation of the Gramm - Bernstein Company, and the latest developments would seem to indicate that the situation was far from being settled.

W. H. Moore, for some time manager of sales with the old company, has resigned to be-



W. H. Moore, teneral Sales Manager, t.ramm-Hernstein Company,

come general sales manager of the Gramm-Bernstein Company. He has grown up with the sales end of the motor truck industry and is regarded as a salesman of excentional ability.

Early in the month John N. Willys brought an action against A. L. White and W. T. Agerter of the Gramm Motor Truck Company, asking for a cancellation of a contract involving the purchase of this concern and alleging irand, in that the linancial condition of the company was not as represented to him.

Correction of Error—In the August issue of MO-TOR TRUCK, a cut of a G. V. electric, made by the General Vehicle Company, for the American Express Company, was used with a capton, indicating that it was produced by the Baker Motor Vehicle Company, which also has sold trucks to this concern.

THE A B C OF MOTOR TRUCK IGNITION.

Part I-Outlining the Various Systems Utilized with the Commercial Gasoline Vehicle,
Their Components and Application in Practise---Practical Definitions of Electricity, Types of Batteries, and Wiring to Obtain Maximum Efficiency.

By C. P. Shattuck.

THE ignition system is one of the most important factors in the economical operation of a gasoline commercial vehicle. The most efficient motor will not deliver its maximum power if the spark at the gap of the spark plug be weak, because a smaller amount of the mixture is burned than would be if the vapor were ignited properly. It is obvious, therefore, that considerable more fule will be consumed, as well as oil, to obtain normal results. Aside from the increased cost of gasoline, due to using a larger quantity, a no small item in the year's expenses in these days of the high price of fact, there is still another view of the situation.

Imperfect combustion lays the foundation for motor troubles, and consequently repair bills, increasing the cost of maintenance, and to keep operating expenses to a minimum the driver should familiarize technical manner the various ignition systems in vogue, onthining their components and operation, and presenting suggestions for installing modern equipment, as well as hints for locating and remedying troubles. The series will be supplemented with illustrations, these including charts and wiring diagrams, a study of which should enable the most inexperienced driver to obtain the maximum efficiency of the power plant.

Electrical Definitions.

Before taking up the various ignition systems in their logical order, the electrical terms will be defined to enable the reader to follow the practical rather than the theoretical effect in the discussions presented herein. No one knows exactly what electricity really is, but its relation to the internal combustion motor may be understood with a little study. It is largely utilized

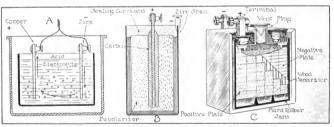


Fig. 1—illustrating the Various Forms of Chemical Batteries: A. Simple Voltale Couple, Usually Called Wet Battery; B. Conventional Type of Dry Cella; C. Lead Type of Storage Battery.

himself with the components of the ignition system. This applies more particularly to the operator of the vehicle which is not equipped with a magneto, and it is surprising to note the large number of delivery cars which depend upon the battery and coil for ignition.

Reliability makes for efficiency as well as economy with the mechanical transport and if the driver does not possess a practical working knowledge of the ignition system, in the event of minor troubles the delivery of the merchandise will be delayed. Even with cars equipped with the magneto and employing the battery as an auxiliary source of current, it is important that the operator should understand the principles of electricity and their application to the internal combustion motor.

It is the intention of the writer to describe in non-

for lighting, heating and power, and in the last named form energizes a motor, while for lighting it heats the lamp filament to an incandescent state. It would not be practical to introduce a wire or filament into the combustion chamber of a gasoline motor for the purpose of igniting the explosive mixture and instead an electric spark is employed, it being produced by bnilding up the initial or primary current and forcing it to jump across the gap of the spark plug at the desired instant, a system familiarly known as the jump spark.

The electricity employed in connection with the motor car is obtained from two sources, chemical or mechanical, the former consisting of dry cells or storage batteries and the latter a magneto or generator. The dry cell provides a certain amount of electicity and is favored because of its moderate price, although



when its energy becomes dissipated it is worthless. The storage battery differs from the dry cell in that its vitality may be renewed by passing a current



Fig. 2—The Edison Nickel-Iron Battery: A, B-4 Type Utilized for Ignition and Lighting; B, Depicting the Construction of the Negative and Positive Plates; C, the Cell.

through it, an operation known as charging. The magneto generates current mechanically when the motor is operating, but the production of electricity ceases with the impulses of the engine.

Chemical Battery.

Considering first the chemical cell: When two dissimilar substances or metals, such as zinc and copper or carbon and zinc, are immersed in an electrolyte, sulphuric acid and water for example, a chemical action takes place upon the zinc and an electrical current passes from the zinc to the copper, in the direction of the arrows as indicated at Fig. 1 A, which is a simple form of voltaic cell. It will be noted that the terminals or posts are connected by a wire forming the external circuit. Any combination of metals may be employed providing they are unlike, and any other salt or acid solution utilized as an electrolyte. The poles of a battery are known as positive + and negative -, and it is assumed that the current leaves the cell by the positive and re-enters by the negative. As the liquid battery is not practical for automobile use because loss of the electrolyte would ensue unless the cells were sealed, it will be dismissed from this discussion.

Flow of Electricity.

The flow of electricity is not generally understood; that is, the reason current will not flow from a battery until its terminals have been connected by a continuous wire or piece of metal. It should be explained first that current is the flowing of electricity and that the simplest analogy for a current is the flow of water, although there is little in common between the two, electricity being referred to as a fluid for convenience.

If two tanks of water at the same level, one being full and the other nearly empty, be connected by a pipe or tubing, the fluid from the full vessel would flow into the other until both contained equal amounts of water. Similarly, when two bodies are charged with unequal amounts of electricity and connected by a suitable conductor, electricity will flow from one to the other as illustrated by the web battery at Fig. 1.A. The greater the difference between them the greater the tendency to return to the original level. This is termed difference of potential, and the terms high or low potential or electro-motive force indicate ***LAFE or **mall charge or condition at different parts. As with the tanks of water, the higher the full one is placed above the other the greater will be the ioree of flow of the fluid to the empty member.

Open and Closed Circuits.

A circuit may be either open or closed and may be changed from one to the other by the simple movement of a switch lever which performs the same function as would a shut-off valve incorporated in the piping between the two water tanks. By referring to Fig. 3 A the action of a current on a closed circuit will be noted, the arrows indicating the flow of electricity from the positive pole through the lamp and back to the cell by the negative terminal. The open circuit is illustrated at B, the drawing showing the switch open. The lamps as used in the sketches merely outline the flow of the current.

Electrical Units.

The units utilized to measure electricity are the ohm, the volt and the ampere. The ohm is the unit by which the resistance is judged. The volt is the unit of pressure, potential or electro-motive force, denoted by E. or E. M. F. The ampere is the unit of quantity or rate of flow. Referring again to the analogy between water and electricity, the ohm may be compared with the pipe connecting the two water tanks. If the tubing he large or small, long or short, rough or smooth, the water will flow correspondingly. In deterricity the resistance increases directly as the length of the conductor or wire, the material, etc.

The volt is similar to the head or difference of level of the water in the tanks,

The pressure of the water in the full tank causes the fluid to seek an escape to the empty member. The

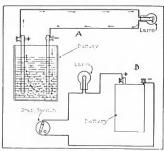


Fig. 3.—Ontlining the Flow of Electricity or Current: 4, Showing a Closed Circuit; B. Break in Circuit by Introducing Open Switch.

volt is the cause of the current, not a part of it. It is the difference in voltage which causes a current to flow from one object to another. The volt may also be defined as that pressure or difference of potential which will maintain a current of one ampere in a conductor whose resistance is one ohm. Therefore one ampere is that current which one volt will maintain in a circuit the resistance of which is one ohm.

The watt is a unit of quantity, or amount of electric energy, and corresponds to a current of one ampere at a pressure of one volt. The term ampere-hour, utilized in connection with storage batteries, means that the member can maintain a current of one ampere for one hour. If the battery is a 60 ampere-hour member, theoretically it should supply a current of one ampere for 60 hours, two amperes for 30 hours, etc.

Construction of Dry Cell.

The dry cell comprises a shell of zinc, which not only serves as a container, but also acts as one of the elements of the cell. The cell is provided with a lining of blotting paper or similar material fitting closely against the inside of the zinc shell and serving to retain the sal ammoniae-chloride of zinc combination elec-

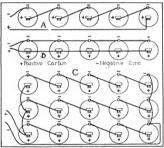


Fig. 4—Illustrating Methods of Wiring Dry Cells to Obtain Increased Voltage and Amperage: A. Series: B. Multiple or Parallel; C. Multiple Series.

trolyte. In the centre is placed a strip of carbon, as will be noted by referring to Fig. 1 B., and the space between the carbon element and the electrolyte saturated blotting paper is filled with carbon dust with which is mixed black oxide of manganese, which acts as a depolarizer, having as it does a great affinity for hydrogen. Over the top of the cell is poured a scaling compound to retain the moisture and hold the components in place.

It should be explained that polarization is not desired as it reduces materially the output of a cell. When zinc and carbon are placed in an acid bath and the outer ends or terminals are connected by a wire, the current produced in the wire by chemical action between the bath and the element of the lower potential, gradually becomes weaker and eventually disappears entirely. This is due to the fact that the free hydrogen, denoted by the bubbles in Fig. 1 A, is liberated from the bath, clings to the higher potential element and not only prevents proper contact with the electrolyte, but sets up a violent action with it. This effect is called polarization and to overcome it a chemical substance is added to the cell which will combine with the hydrogen as it is generated and prevent it from gathering on the positive pole, thereby reducing the output of the cell.

Referring again to the components of the dry cell: The filler of the zinc shell is packed tightly to diminish or lower the internal resistance. One of the reasons why dry cells of the same size vary so much in amperage is that the filling compound is packed in more tightly in some than it is in others. In some cells the utilization of certain substances which both mechanically and electrically tend to lower the internal resistance, increases the amperage output of the cell, and the life of the cell is cut down.

The filling compound, as a matter of fact, is moistened and being packed in tightly acts as a part of the earbon element, coming directly in contact with the blotting paper saturated with the electrolyte which, in turn, is in direct contact with the zinc. The paper lining serves to prevent the material from coming in contact with the zinc, thus creating a short circuit and ultimate deterioration of the cell. As a current is generated by the oxidization of the zinc element, which is eventually destroyed by chemical action, the elements of the cell are so arranged that all components deteriorate in the same proportion. The reason for making the zinc element the container and of such large proportions, is that a large surface is presented to the action of the current, increasing the volume of electricity. As the cell itself forms a portion of the circuit through which it must force a current, it is obvious that to obtain the maximum amperage or rate of flow, there must be the best possible contacts between its various parts. A cell of this type gives an electromotive force of 1.5 volts.

The Storage Battery.

The term storage battery is a misnomer, as it does not store electricity. Although it is thought by some to be similar to a vessel of water in which fluid may be drawn off as desired, such is not the case. As with the wet battery, with the circuit closed electricity is produced by chemical action.

At Fig. 1 C is depicted a storage battery of the lead type with the walls cut away to show its construction. It will be noted that the cell is composed of a number of plates in two sets, these being known as negative and positive elements, and that they are immersed in an electrolyte consisting of a solution of sulphuric acid and distilled water. The arrangement of the plates is such that the number of negative members exceeds those of the positive and they are grouped alternately with negatives on the outside.

The original or Plante type consisted of two plates of metallic lead immersed in a vessel containing sulphuric acid. An electric current was passed through the cell and the surface of the positive plate was converted into peroxide of lead, an operation called charging the battery. Plante and other authorities held that in charging, peroxide of lead is formed on the positive plate and spongy metallic lead on the negative, both being converted into lead oxide by the discharge. Others hold that sulphate of lead is made on both plates by discharging, and that during the charging, peroxide of lead is formed on the positive plate and metallic lead on the other, the sulphuric acid being set free.

In the Faure type, which is more commonly used, the active material in the form of lead oxide is pasted on and hardened, after which it is treated by an electrochemical process converting the paste on the positive member into a brown peroxide of lead and the negative into a gray, spongy lead.

A storage battery fully charged is practically a primary cell, as the plates in the electrolyte are a voltatic couple, such as the carbon and zinc in the dry cell. If the terminals of the storage battery are connected in a circuit, current will continue to flow through it until the elements are reduced to such a condition that there is no difference of potential. The application of the electric current in the process of charging, transforms the active material on the plates so that they become a voltaic couple again. The discharging and charging process may be continued indefinitely, depending upon the condition of the plates.

Arrangement of Components.

The plates are separated by strips of wood, cliemically treated, or hard rubber, and these non-condictors are so constructed as to allow passage of the electrolyte to the plates, which are compactly arranged within a container of hard rubber. The tops of all the positive plates are connected by means of an acid proof lead bar which extends at one end of the cell through the cover at the top. The negative plates are similarly connected on the other side of the cell and provided with a terminal. Each cell is provided with a vent plng which permits the escape of the gas when the battery is being charged.

The voltage of a cell is fixed by the elements and the density of the acid employed, and is about two volts in the type utilized for ignition purposes. The amperage capacity of the cell, however, is dependent upon the size and number of plates and it is obvious that the greater the surface of active material exposed the larger the ampere-hour capacity. Cells are usually arranged in groups of three to obtain six volts, but the ampere-hour capacity may vary from 40 to 120. The charging, testing and care of storage batteries will be considered in logical sequence.

Edison Nickel Iron Battery.

A battery differing in construction from the lead type is the Edison, the components of which are illustrated at Fig. 2, and it will be noted that the plates shown at B differ from those previously described. The negative or iron oxide plate consists of a series of rectangular pockets in horizontal rows in a nickel plated grid. The pockets are formed of thin nickel plated steel perforated with fine holes. These are filled with iron oxide. The pockets are subjected to high pressure so that they are practically integral with the oxid.

The positive or nickel hydroxide plate, consists of rows of tubes of about the size of a pencil held in vertical position by a steel supporting frame. The perforated tubes into which the active material is loaded are made of a high grade nickel steel. The tubes are formed with double lapped spiral seams and are reinforced by eight steel rings which prevent expansion as well as insure perfect contact.

In a cell the positive and negative plates are assembled alternately, the positive members being connected with the positive pole and the negatives with the negative pole. The plates of each group are suspended from a connecting rod integral with the pole. They are correctly distanced on this rod by nickel plated steel spacing washers, and are retained in contact by nuts screwed on at both ends. The separators are round rubber rods and the plates are prevented from coming in contact with the wall of the jar by strips of hard rubber.

The jar is of sheet steel and the walls are corru-



Fig. 5—Chart Showing the Comparative Life of Dry Cella Connected in Various Groups.

gated to afford strength. The cell is electro-plated and this plate is fused into the surface of the steel to prevent scaling. This plating protects the jar from oxidization. The electrolyte is a 21 per cent, solution of caustic potash and distilled water, and requires no other attention than occasional filing of the cells with pure distilled water. One of the qualities of the Edison cell is that it may be left for an indefinite period in either a charged or discharged condition without the slightest deterioration.

Wiring of Dry Cells.

It has been explained that the electro-motive force of each dry cell is 1.5 volts and as the average number of volts utilized to operate high-tension coils is six, the cells are wired together to obtain the desired voltage. The methods are known as series, multiple and multiple series and are depicted at Fig. 4 A, B and C, respectively.

When wired in series the carbon terminal of one cell is connected to the zinc post of the adjoining cell and the carbon of the latter connected to the zinc of the next battery and so on until the group is completed. This leaves a zine terminal of the first and the carbon post of the last free, and to each of these is attached a wire, forming the negative and positive poles of the group. When the two free ends of the wires are connected, a circuit is completed as illustrated at Fig. 3 A. The voltage of the five cells wired in series as a Fig. 4 A is five times 1.5, or 7.5 volts. The amperage of the group is not increased over that of a single member.

Multiple or Parallel,

The amperage or output of capacity of the same group of cells may be increased by wiring them in multiple or parallel as outlined at Fig. 4 B. Here the zinc terminals are wired together and the carbons connected. The total amperage or output will be five times that of a single cell. The voltage, however, is not increased over that of a single cell as the arrangement forms practically one cell with an increased amount of material in the elements.

Multiple Series.

When the cells are divided into equal groups, each being arranged in series and the groups connected in multiple to the outside circuit, the batteries are con-



Three-Ton G. M. C. I tilised as Produce Wagon in Detroit,

nected in multiple series. This increases the life of the cells, which is due to the fact that the amount of current used is drawn equally from each set, so that if four sets were employed the current drain on each would be only about one-fourth of the total. The multiple series of wiring is shown at C and here 15 cells are utilized. The voltage of the groups is equal to that of one cell multiplied by the number of cells in series while the ampere capacity is equal to that of one cell times the number of groups. Thus it will be seen that in series the voltage is increased, not amperage, while a multiple arrangement increases the output canacity.

Service of Cells.

The economy effected by utilizing dry cells in multiple series is illustrated at Fig. 5, which depicts cells in series, also multiple series, and the comparative service of life by these arrangements is shown by the chart. The result of tests conducted by a leading dry cell maker is also given under the heading of arrangement of cells. In these tests the motor was equipped with a timer and coil and its average speed was 20 miles an hour. The service was continuous and the engine was not stopped until it began missing explosions. The hours of service and computed mileage are also given, and the economy of multiple series is apparent.

(To Be Continued.)

Ed. Note—The next installment will deal with the various instruments utilized in measuring electrical units, explaining their use, also outline differing forms of conductors.

G. M. C. IN MARKET GARDENING.

Replaces Seven Horses in Hauling Fruit and Vegetables in Wholesale Quantities.

The experience of H. J. Purse, engaged in the wholesale fruit and vegetable business in Detroit, with a three-ton G. M. C. truck, made by the General Motors Truck Company, Pontiac, Mich., has been such as to justify him in changing from horse drawn methods. The results not only indicate a decided sasing in economy, but the ability to make speedy deliveries is a factor of some moment in this particular line.

An accompanying illustration shows the ear loaded with 75 barrels of potatoes, lettuce and garden truck, which were all delivered to one man on the Eastern Market in Detroit. The weight of the load was about 4.5 tons. In addition to the produce raised in the vicinity of Detroit, berries, peaches, apples, etc., which come to that city from the South, are handled in the same manner.

The truck leaves the garage every morning between 1 and 1:30, and delivers several loads of fresh frants and vegetables to the markets before 9:30. During the remainder of the day it is employed in making deliveries to grocers and markets all over the city. The daily service aggregates from 14 to 17 hours. Under the previous arrangement two double teams and three single-horse wegons were utilized in this same service.

MACKS IN LUMBER HAULAGE.

One of These Vehicles Does Practically 10 Times the Work of a Two-Horse Team.

The Western Lumber Company, San Diego, Csl. one of the largest operators in this class of service on the Pacific Coast, recently tested the efficiency of motor transportation as compared with its horse equipment for the delivery of lumber from San Diego to Miramar, a distance of about 20 miles. The lumber was utilized in the construction of a private residence cesting approximately 815(0)000.

An accompanying illustration shows two Mack vehicles, made by the International Motors Company, at its works in Allentown, Penn, one being of five tors capacity and the other of seven. These vehicles were equipped with a derrick, which unfortunately is not shown in the bicture, this being utilized for quick load.



Mack Trucks of Five and Seven Tons Capacity, Engaged to Hauling Lamber on Pacific Coast.

ing and unloading, and by means of which it is stated that the entire load was placed on the vehicle in five minutes.

In another special work, one of these trucks hadded 40,000 feet of lumber in 10 hours from the docks a distance of two miles. The company states that the lumber arrived so fast that the entire force of men at its disposal was required in order to prevent a congestion of the material. The best that a two-horse feam could do in the same time was three loads of about 1500 feet each.

PEERLESS SELF-DUMPING BODY.

Alabama Fuel Dealer Does the Work of 12 Mules with Five-Ton Vehicle.

By the use of a new serew power hoist dumping bedy, designed by the Peerless Motor Car Company, bedy, designed, O., the Southern Fuel & Material Company of Mobile, Ala, has accomplished the transportation of 150 tons every 24 hours with its five-ton Peerlestruck. Night and day work are undertaken, the daily average heing 100 miles. Twelve mules are being replaced in this work, the truck body carrying from five to six tons of gravel and in wagons formerly drawn by mules, which are now used as trailers, 25 tons more are handléd. The average distance of the hauls is five miles.

Accompanying illustrations show the hoisting mechanism, and suggest its method of operation. By this arrangement the load is dumped in 30 seconds. The truck is backed into position and the lever that inhatches the tail gate is tripped. Another lever turns the power of the truck motor into the dumping mechanism. The front end of the body rises rapidly, and the loose material finds its way out the rear end by gravity.

The power hoisting arrangement is such that the car may be started on its return at once. A touch upon the controlling lever causes the body to begin moving downward and it continues to descend while





New Serew Power Hoist Peerless Dumping Body, Which is Repincing 12 Mules in Alphama—Hoisting Mechanism at the Left.



One-Tan Adams Truck in Service with Beacon Lighting Company, Pittsburg, Penn.

the truck is in motion. When the body reaches its normal position the mechanism is disengaged automatically, and it is maintained that the entire process is accomplished without undue effort on the part of the driver.

ADAMS FOR LIGHTING SERVICE.

Special Attention Is Being Paid to Matter of Body Design for Varying Requirements.

Decided success has attended the introduction of the Adams one-ton trucks, made by the Adams Bros. Company, Findlay, O., which concern is well known in the business world, because of its long connection with engineering and manufacturing in various branches. Special attention is being paid to the matter of body design, and an accompanying illustration shows one of these trucks, equipped with a special body for the Beacon Lighting Company, Pittsburg, Penn.

The company has been engaged in the manufacture of machinery for the past 40 years. When it decided to enter the power waron field the entire needs of the industry were studied with care, and the one-ton Adams is held to represent the best that its engineering force could produce. It will be noted that the chassis presents several special features while the body in this instance has been designed to take care of the work to which it will be put in the most satisfactory manner. The ear in question is said to have demonstrated its value in an economical and efficient manner.

ANOTHER WORM DRIVEN TRUCK.

Smith-Milwaukee Is Giving Satisfactory Proof That It Is a Successful Type.

While the Smith-Milwankee three-ton worm driven truck was revealed during the commercial vehicle show in Chicago last February, little opportunity had been had to judge of its merits at that time. This should not be taken to mean that this product of the A. O. Smith Company, Milwankee, Wis., had not been thoroughly tested under every condition of service, but, inasmuch as it had only recently been placed in the market, it was impossible to indicate what success it would demonstrate in the hands of purchasers. An accompanying illustration shows one of these cars in service with the Tews Line & Cement Commany of



Three-Ton Worm Driven Smith-Milwaokee in Service with Tews Lime & Cement Company, Milwaukee, Wis-

that city, and it is stated that it has proven satisfactory from every viewpoint.

The Smith-Milwaukee product represents years of study and experimenting on the part of this manufacturer, which is recognized as one of the pioneers in the automobile business, having been engaged in the production of parts for a number of years. For the past 10 years it has devoted its entire time and attention to this work. Its present plant supplies 12 acres of floor space.

The chassis is designed on the unit assembly plan, and each of the more important units can be removed bodily from the truck without distarbing any other part and with the least possible loss of time. Two features of construction stand out prominently, these being the worm driven rear aske and the selective individual clutch transmission, in which the gears always

The firm of Spaulding & Spaulding in Buffalo, N. Y, had felt the need of better equipment for some time and after making a careful survey of its requirements decided that in delivery matters an improvement could be made, providing the cost were not prohibitive. As has been true of a large number of dealers this concern found itself lacking in dependable figures with reference to the horse equipment, and for some time before purchasing Pierce-Arrow five-ton trucks, made by the Pierce-Arrow Moor Car Company of that eity, began keeping accurate account of delivery costs, as well as complaints on service.

The first truck was placed in service about Sept. 1, 1911, and the figures to June 1, 1912, show that it actually handled 7916 rons of all grades of coal at a cost of 27.9 cents a ton, this figure including six per cent, interest on the investment, general insurance of necessity.



Plerce-Arrow Five-Ton Worm Driven Truck Employed in Coal Delivery by Spaniding & Spaniding, Buffalo, N. Y.

are in mesh. The entire construction throughout makes for strength and simplicity.

PIERCE-ARROW COAL FIGURES.

Experience of Buffalo Concern Indicates Car Will Do the Work of Five Horses.

The demands upon the coal dealer for more prompt and cleaner service are growing more and more pronounced. Undoubtedly much of this is due to the fact that some dealers in each city have installed motor trucks. The possibilities of this method of transportation have been demonstrated and the high standard of deliveries, judging from a time basis, has come to be regarded as something to be expected generally. For this reason those who have not already adopted motor transportation have felt themselves somewhat handicapped.

sary kinds, the wages of one driver and a helper, tire expense, gasoline, thiricants, repairs and a fair annual allowance for overhauting, as well as an ample margin for depreciation. It was found that in tonnage, the truck did the work of two two-horse teams and one single, reducing the cost by 20 cents a time.

Within the same period, 8908 miles were covered, in the matter of fire service, it was found that the allowance for this was far below the actual results, it being estimated June I, that the tires were still capable of at least 1000 miles. That the installation was in every way satisfactory, is borne out by the fact that the Pierce-Arrow Motor Car Company delivered its second fixe-ton worm driven truck to this concern June I.

P. D. Schenck, president of the Speedwell Motor Car Company, Dayton, O., has assumed the responsibilities of general manager as well. NO 9



VOL. III. SEPTEMBER, 1912.

AUTOMOBILE JOURNAL PUBLISHING COMPANY
Times Bldg., Pawtucket, R. I.
William H, Black, Treasurer. D. O. Black, Jr., Secretary.

Publishers of

THE AUTOMOBILE JOURNAL THE ACCESSORY AND GARAGE JOURNAL 'Phone Pawlincket 1006,

EDITORIAL DEPARTMENT:

CARL A. PHENUR. C. P. SHATTUCK. WILLIAM W. SCOTT.

ADVERTISING DEPARTMENT

New EnglandJohn W. Queen, 6 Beacon Street, Boston, Mass.
Central States-

W. H. Blodgett, 25 West 42nd Street New York City. Those Bryant 3728.

Western States-

G. A. Eldredge, 304 Sun Building, Detroit, Mich. 'Phone Cherry 2240. U. G. Larian, 4707 Magnolla Ave., Chicago, Ill.

PUBLISHED THE FIRST OF EACH MONTH.

SUBSCRIPTIONS:

The United States and Mexico, the year, \$1 is advance; Canada and Poreign Countries in Postal Union, the year, \$2 is advance. Fifteen ceats the copy.

ADVERTISING RATES.

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding. Anonymous communications not considered. Correspondence on tractors, all moter driven form, fire and municipal apparatus, the motor industry and the Irade, will receive attencible contributions.

Sulered as second class matter, February 25, 1911, at the Postoffice at Pawtucker, R. L., under the Act of March 3rd, 1879.

PROBLEM OF EFFICIENCY.

The importance of the motor truck in solving the transportation problem is only just beginning to be realized. That it is an economic factor in the haulage of goods has been proven. It only remains to secure the utmost efficiency from the vehicle, which is recognized as possessing mechanical efficiency in every respect.

This problem of efficiency is somewhat new. When economists discovered ways and means of laying many more bricks in a given time by arranging matters so that the masons could handle them much more rapidly, the masons were by no means enthusiastic at first. It was only when they were made to appreciate that by laying more bricks they were worth more to their employer that they were willing to co-operate in carrying out the new scheme.

The spirit of co-operation is equally necessary in bringing about the utmost efficiency which may be expected from the mechanical transport. Building contractors may assist by so placing their concrete mixers, for instance, that they may be accessible to the trucks. Retailers could assist by so arranging their receiving space that the wholesaler could make the quickest possible delivery. The list might be increased indefinitely, and with each the resulting economy to the party of the second part is quite as marked as to the car owner.

SEEKING MOTOR TRUCK DATA.

That there is a well defined movement in favor of the more general adoption of the motor vehicle for commercial purposes is borne out by the fact that trade organizations are seeking opportunity to collect data which will be of service to their members in making selection of the proper car for their needs. This applies particularly to national bodies, although there is at present a tendency on the part of local boards of trade to take up this matter in a systematic manner.

Fire department heads have been giving the subject attention for some time, and the major portion of their annual convention programmes is devoted to discussions of results obtained in various sections. Within a few mouths the undertakers, laundry proprietors and others have taken up the subject in a similar way, It would appear that there is to be generous demand for carefully collected and readily assimilated information of this character.

THE ARMY MANOEUVRES.

That the United States government has decided to continue its experimentation with mechanical transports in connection with the annual militia manoenvres is strictly in keeping with the stand which has been taken abroad. The War Department has been criticised freely because of its seeming lack of enthusiasm regarding the subject, and on the face of things France, Germany, Anstria and other foreign nations appear to have progressed much further along these lines.

When it is remembered that trucks of American manufacture have competed successfully with the best of foreign productions in war trials which have been conducted abroad, it would appear the home government had little to lose in encouraging production along these lines. British motorists take extreme pleasure in pointing out that road conditions are by no means ideal in America, but it hardly will be denied that they compare favorably with those over which some of the recent European trials have been conducted, and in which the product of the United States showed up so well.

ELECTRIC TRUCKS IN MILL SERVICE.

Pacific Mills, Lawrence, Mass., in Haulage Largely Yard Transfer, with an Admirable System, Saves About 20 Per Cent. of the Cost of Similar Work with Animal Vehicles.

By William W. Scott.

EVERY investigation of the cost of highway transportation has demonstrated the seemingly utter indifference of business men to the possibilities of economies in haulage. There can be no other reason for this than the fact that existing conditions have been regarded as quite beyond the control of any person or persons. It would appear that custom had been followed generally and with rare exceptions nothing was or is known of the expense of service, even with equipment of large proportions.

It will not be maintained that failure to systematically account the cost of vehicular transporting is due to lack of knowledge of the value of accounting. It will not be assumed that expenditure for hanlage is absolutely inconsequential, but because such expense must receive at lesst easural attention, it is reasonable to year. This has been in greater ratio with highway conveyances than with other forms of transports because the neglect to economize, while with public service corporations endeavor has been made to minimize expense wherever possible. It may be said that the best examples of system and organization are the ratitroad and steamship companies, which have been developed with long experience and are directed by men of undoubted ability, whose success has been achieved in competition with the acknowledged experts of the nation, if not of the world.

It may be said that these concerns expend large sums improving their facilities and equipment because the one purpose is to carry greater loads for the same cost or the same loads for lessened expense, and to save the time of the men and to reduce the maintenance



The Fleet of Pive General Vehicle Machines Leaving the Garage of the Pacific Mills, Lawrence, Mass., for the Day's Work.

to conclude that there is no consideration of whatever cost conditions may appear to require.

In striking contrast with this policy is the very general desire to limit and restrain the charges of the public service corporations, it being maintained that trade and commerce may be seriously affected, and even controlled, by such organizations. This is instanced to establish beyond question that the transportation cost has been considered when exact figures were known. These, however, came to the shipper from the carrier and issue taken concerning them has been invariably by the former, to endeavor to bring about modifications and changes of prices fixed by the latter.

No one will deny that the cost of transportation, no matter what the character, is increasing from year

charges. Efficiency of service is sought from every point of view. All factors are considered. But it must be understood that these do not deal with highway conditions save in the case of express delivery, and usually under the most favorable circumstances for work. It is only by accurate knowledge of expense that such cuterprises can be made profutable, and the more detailed the information the more certain and dependable are the conclusions.

It has been agreed that the most profitable form of transportation is the long haul, and the least productive the short hanl, and this has been the experience with so many that the exception is occasion for surprise. But as few entreprises can select the most profitable and avoid the most unprofitable and all lines ness demands must be given a reasonable degree of attention, the service must necessarily be as required by the conditions in which it is maintained. Within the last decade the radius of highway haulage has increased materially, and it is probable that it will continue to increase until the limitations of the business have been reached, but no one will today attempt to define where the line of demarcation can be established with reference to any specific subject. It will, no doubt, eventually be practical to make exceedingly close estimate and to differentiate which form of transportation is best adapted to meet stated requirements, but this will not be possible until absolutely accurate data have been obtained and carefully arranged.

While the radius of haulage has been increased, generally speaking, there has been even larger growth of volume of shorter hauls, and where traffic has become in any way congested speed is limited to the logic to justify their suppositions. In fact, it is clear enough to these men that they have utilized their vehicles with careful judgment, and the results are regarded as being quite as good as any person could accomnish under similar conditions.

It has been maintained that in the utilization of motor vehicles the one handicap was the continuance of methods the vogue with animals, and the measuring of service by animals. It has been established quite conclusively that hoese cest has been fixed much in excess of what it ought to be, and that the neglect to adopt means for using the motor wagons that would insure the largest measure of return has lessened the margin of economy materially. That is to say, that many men have taken the market price for renting horses and carts, which assumedly carried a reasonable profit to the owners, and placed against this the reduced earning capacity of their motor vehicles.



The Electric Wagons and Trucks Awalling Orders After Reporting to the Office of the "Illapatcher," Who Directs the Service.

average of the movement unless special provision has been made to systematize the use of the streets. This is done in many cities and the result has been very gratifying, but such regulation does not expedite haulage for but a very small part of the haul.

In the use of motor vehicles there is an opinion prevailing that these are best adapted for long hauls because of the superior speed, and that when the stops are frequent and the trips of comparatively short distance there is so small a margin when contrasted with animals that it is not profitable to utilize them. This conclusion appears to be based on experience with all forms of conveyances, and it is honestly shared by those who have worked both animal and moto wagons and have been satisfied with their decision. There are those who will analyze a condition from their experiences, and point to what appears to be sound business.

One of the most interesting examples of the use of motor wagons in short haul service is afforded by the Pacific Mills, Lawrence, Mass., a manufacturing corporation that employs in excess of 6000 persons and has a number of plants. The company manufactures cotton and worsted textiles, has a large bleachery and dychouse, and a print works that will be, if plans fructify, the largest establishment of the kind in the world. This concern has practically eliminated animals from its service. In fact but one horse is now worked and this is kept busy in the yards at a constantly changing service. It might be possible to eliminate this without the change being noted.

The unils are located at either side of the Merrimac river, and are so situated with reference to the railroad that all the shipments of raw materials and supplies, as well as the manufactured products, are received and



The Two 3.5-Ton General Vehicle Trucks, the Largest of the Regular Service Machines, in the Garage Vard.

sent out on spur tracks that enter the mill yard and are with terminals at the different storehouses. It will be seen from this that all the haulage that might be expected under less advantageous conditions is climinated. Not all manufacturing plants have such facilities, and no doubt this results in a large saving each year.

As might he assumed the corporation has been long established and it has been successful. What has been accomplished has been largely resultant of organization and system, and by the utilization of every economy that was practical. Its management is conservative and whatever is undertaken is with careful consideration of all the possibilities and in accordance with well matured plans. Up to 3.5 years ago all of the haulage was with animals and wagons. Now the company has a service department of considerable proportions and an admirably equipped garage, and all of its work is done with motor vehicles. All of its work is short hauls. This is exactly the class of transportation that the users of horses say is best adapted to them and in which the truck is least profitable.

The statement is made that the saving with the

power wagons will approximate 20 pet cent,, which is much larger than what would be considered necessary to justify a transition of the service, and this economy has been realized without sacrifice of any kind. To the contrary there has been an expansion that has been in every way satisfactory. It is not maintained that the fullest results have been attained, but what has been accomplished has demonstrated the wisdom of the change.

About the opening of 1909 the Pacific Mills had a stable containing 15 horses and the animals were worked singly and in teams about the yard. The work was not in haulage to shipping terminals because of the railroad facilities, but it was necessary to have them hauling between the different departments. Perhaps it might be well to outline the service. The purchasing department of the mills has supervision of the stables, storage and the transporting. Every purchase is made by this department and it maintained at convenient locations in the mill yard storehouses in which were stored all of the supplies necessary in the different mills. To illustrate, these supplies may be machinery, machinery parts, belting, oil, grease, paint,



The Two Two-Ton tieneral Vehicle Wagons Lacd for More Rapid Work in the Pacific Mills Regular Haulage.

glass, brooms, shovels, tools of all kinds, pipe, pipe fitings, plumbing supplies, different dyeing and bleaching materials, and the thousand and one articles used in maintenance and operating as well as manufacturing

It would not be practical to place these supplies in a common warehouse, or in each null building, to be drawn upon indiscriminately. Economy has impelled that many of the purchases be made in large quantities and stored until required, when they can be distributed as required upon requisitions that will account for everything, as in an establishment of this kind manufacturing cost is computed to the thousandth of a cent, and a very slight percentage of loss would in the aggregate be a large sum. It might be well to emphasize that it is the saving of the small items that brings real economy, and as may be assumed the system of the Pacific Mills was the result of years of experience and thorough knowledge of every possibility.

sible to learn the exact cost of operating and the approximate work of each animal. From this it will be understood that the company in its teaming followed its system of detailed accounting and had precise knowledge of expense and work. In this respect it differred from the great majority that include handage and delivery in one or more items in general operating ex-

The experience of the company was that horses could do about a specified work each day as an average. In extremely hot weather it was necessary to favor them. In winter the horses could not haul as much when the streets were rough and snow a partial obstruction. There was perhaps seven months of the year when the theoretical efficiency was realized. When it was necessary to work the horses overtine it was found imperative to give them relief or rest, and this meant hiring animals temporarily or baving a sufficient number of extra horses to meet such exigencies



The One-Ton General Vehicle Wagos, Without Cover, to Take Care of Bulk) Loads Not Practical for the Enclosed Machines.

The horse service had been organized with realization of the capacities of the animals and the work that could be expected of them each day. A very accurate account was kept of the expense of operating, but it was not practical to give the exact cost of each animal because of the physical difference in them, so far as food requirements were concerned, which was reflected to some extent in the cost. In other words, some horses cost more to keep and use than others, and some animals were capable of more work than others. The actual expense of maintaining the service, however, was known, and it was averaged to the animals, which was believed to be a sufficient accounting as to cost. In connection with this it might be pointed out that there were some charges that were fixed for a year, such as veterinary attention, and there were the other constant or overhead expenses. It was not practical to keep the exact work of each horse, but the total volume of work was recorded and so for any given period it was posas might arise. It was found, as thousands of others have experienced, that there was a limit to the capacity of the horse for work, and there was no reserve that could be utilized to advantage. By this is meant that there was no reserve if it was desired to obtain the fullest service of the animals, to conserve them with a view of realizing their constant capacity for the longest period possible.

In analyzing the service required by the mills it should be said that it was well organized. According to the requirements the work was systematized and each driver had specified routes to cover, driving back and forth between the storehouses and the various departments, handling the freights as quickly and judictiously as was possible. Loading and unloading occupied a comparatively larger proportion of the entire time, because the hauls did not average more than 2000 feet, and while in some instances assistance was given the driver and helper on each team, as a rule they were



Knox Two-Ton Plutform Truck, the Type of Vehicle with Which the Experimental Haulage of the Pacific Mills Was Madr.

expected to handle the freight without help. One work was street watering in a section where the company's tenements were occupied by its employees, and this varied according to the weather conditions. Aside from this, however, there was what might be regarded as a constant service, with occasional demands for haulage that was of necessity performed at night.

The winter conditions at Lawrence are by no means extreme, but there are heavy falls of snow at times, and it is not uncommon to have highway trafficmore or less impeded for a considerable length of time, It is expected that during such periods the capacity of the animal vehicles will be materially reduced.

The company had statistics showing accurately the cost of transportation by animal vehicle. It was then, and no doubt is now, entirely practical to obtain figares for any specified length of time relating to the entire service and to apply these as a unit, so that the cost a ton-mile could be established without doubt. It may be that these figures would show what would be a higher cost a ton-mile than might be realized with a longer average haul, but from the viewpoint of the company what could be obtained under other conditions or circumstances was not material. Its requirements were known and the one purpose was economy with its service, and such saving was possible only by the reduction of the ton-mile cost,

The value of properly accounting the operating and maintenance cost of a haulage service could not be better illustrated than with this experience. These figures established facts that are ordinarily guessed or estimated, and which were the only dependable foundation on which to judge transportation efficiency. So it can be said that the Pacific Mills problem has been



Three-Ton Knox Truck, the Largest Vehicle of This Type in the Service, I tilized for Buiky Freights on a Rule.

worked out in an ideal manner. Nothing was uncertain and every available channel for saving was understood.

The company decided to experiment with power wagons and purchased a second hand Knox machine, placing it in service with its horses. It was realized that a used power truck was not as economical from any point of view as a new webicle, but experience was desired. The work was begun in the winter, when the conditions are most severe. The truck was worked under every condition in which it was believed tests should be made, and for a sufficient length of time to establish whatever facts were desired. Naturally, careful record of service and expense was kept, and with reasonable allowance it was found the truck was economical. By this is meant that the use of the truck by its previous owners, the somewhat larger expense for maintenance, the lack of experience, the possibilities of

found there was a saving, to say nothing of the reserve capacity, and after a period of careful observation and experiment the company purchased a second used Knox truck and continued the demonstration on a larger scale.

In observing the work of the truck a purpose was to determine what would be the most satisfactory system of utilizing them. Horse methods, if they could be continued, could only be expected to yield the more service through increased speed and larger capacity, and it was realized that overloading and excessive speed would result in deterioration. Economy of time in loading and unloading could be applied to horses just as well as to mechanical vehicles, so there were limitations as to the possibilities with the new forms of convexance.

The experimental work covered a period of approximately a year and then plans for a complete transition



International Harvester 1500-Pound Wagon, One of a Pair of Machines Used for Errands and Emergency Calls, Sesides Regu-

greater economy with more complete facilities for garraging and repairing the machine, the purchase of supplies in quantities, and other factors were considered, and while it was understood that the relative values depended materially upon administration there was no question that in the aggregate they would amount toconsiderable.

It was found that the truck was as efficient at the end of the day as at the morning, that it could be worked overtime with no diminution of capacity, that it could be depended upon for capacity work winter or summer unless in the event of a very severe snow storm, that it could be worked continuously with mereby a change of drivers, that it required no more systematic care and attention than any other machinery, and that were it not in use the cost of idleness was binned to the fixed charges. Comparing the record with the cost of similar service with horses it was of the service were determined and developed. These included the construction of a garage that has a capacity of 20 machines. This building is a single story, of sufficient height to permit sheltering any power vehicle that can be used, with different bays so that the vehicles may be backed into them and with sufficient space about the machines that they may be cleaned, examined or repaired. The structure is brick and concrete and it is practically freptroof.

The garage is designed with a floor area that will allow 14 vehicles to stand side by side in the seven bays, with space between them and the entrances that will accommodate six and possibly seven others. There is a series of windows at either side of the walls, high above the floor, permitting good light. Instead of one or two entrances, requiring considerable floor space for shifting when entering or leaving the building, eight wide doors require practically all of the front of the ga-

race below the windows. These doors are separated by large concrete posts or columns which support the side wall and roof. The doors are of the steel curtain type, that are raised or lowered and are so balanced that they may be opened any height desired and left perfectly secured. This design permits the use of the entire floor and the shifting and turning is done out of the building, where there is little, if any, probability of accident. At the street end of the building is the office, a small apartment where the drivers may make out their reports, where they present themselves each morning before leaving, and where a watchman is on duty day and night. At the other end of the building, occupying the space taken by one of the sections or bays, is the repair shop, into which a truck can be run. with abundant area for work. This shop is equipped with such machine tools as are necessary for work on the vehicles, ample bench space and hand tools for the

repair man, and with chain holsts and other facilities for handling heavy weights. The power is supplied by an electric motor, the current being furmished from an adjacent power plant.

On the side wall, high above the door and out of the way, is a balcony, and on this is located the charging panel of the garage, which is designed to charge 12 electric machines at one time. This installation is m every way complete and is probably an ideal in that it is impossible for an accident through ignorance of the dangers from contact with the panel and wiring. It cannot be reached save by a ladder and it is under the observation of the mechanic in charge of the work

during the time the shop is the flat open. At other times only the electrician who supervises the charging of the electric vehicles has access to the panel.

In each of the six bays or spaces of the garage floor are two charging plugs or receptacles, so that any of the electric machines may be charged when desired. The current is available at all times. It is not necessary to shift the electric trucks to any particular place or confine them to any section of the garage. The mechanical work at the garage is in charge of a single machinist, who can have what help is necessary should a job require, and he has the resources of the mill machine shops for such machine tool work he cannot do with the garage equipment. Of course parts and material for practically every emergency are carried. When work is necessary the main object is to complete it as rapidly as is possible that the service may not be lessened.

In the experimental trials easoline wagons were used exclusively, and it was natural enough that when the regular installation was decided on and the horse service was to be gradually reduced this type of vehicle was first employed. The transition was brought about as circumstances permitted and as the wagons were acquired the horses were dispensed with. During the 3.5 years since the trucks were first used the company had built three large mills and work is now progressing that will make the print works the largest enterorise of the kind in the world. Reference is made to these facts because the haulage is made by five General Vehicle wagons, three of 4000 pounds and two of 7000 pounds; by five Knox wagons, four 4000 pounds and one 6000 pounds; one White 10,000-pound truck, and two International Harvester light wagons. This is a total of 13, and to state that this number of machines had been substituted for 15 horses would by no



A Section of the Repoir Shop of the Pacific Mills Garage, Showing the Charging Panel on the Balcony, and Some of the Mochior Tool Equipment.

means represent facts, for it is probable the work had been increased three times as compared with what was required 3.5 years ago. At least there is work enough to keep them all busy, and the prospects are that more will be added, as the manmodb print works will probably add to the requirements considerables.

The methods the vogue at the Pacific Mills are such as to impel the admiration of the investigator of vehicle haulage. Based on practical experience and directed with care it is evident to any observer why they have been productive of economies. It is a common sense system and it is as simple as it is efficient. First of all the garage foreman or mechanic is responsible for the condition of the vehicles. He is expected to have them ready for service each morning, unless it is impracticable or impossible to work them. When the drivers report to the garage the wagons are ready for them to start.

The work is then directed by the "dispatcher." who occupies precisely the same relation to the service that a train dispatcher does in steam railroad operation. There is in the dispatcher's office a sheet on which is printed the name of the 35 different regular places of delivery from the storehouses in the order of outward and inward trips, and columns for each vehicle doing this distribution. One column covers each trip. This same sheet covers the work that may be done by practically all of the machines in regular assignments, and to it is added any record that may be necessary to account for special work.

Taking a truck as an example: All drivers leave the garage when instructed to do so by the dispatcher, who telephones the garage office when the drivers have reported to their vehicles, and immediately each man takes his machine out for the work assigned for him. The time of reporting is noted by the dispatcher and from the time the machines leave the garage they are absolutely under his direction. No work can be done and that receipt from and delivery to the trucks must be expedited. Each order is recorded by the dispatcher and when an order is given a driver by telephone it is written on a form and after the work has been performed the order is delivered to the "store office." The trucks and wagons all report to the dispatcher whenever a trip or a work has been completed and the next work is assigned and taken up without delay.

It will be understood that there are no opportunities for the drivers to lose time unnecessarily. They are required to live up to the schedules and to complete them as early as they can consistently. In the event of accident notification is immediately given and the dispatcher provides a relief vehicle.

The wagous engaged in irregular or special work are as carefully kept track of. They are allowed time for the loading, distance travelled and the unloading, and are required to do the work in that time. The light wagous and the large truck are worked on differing assignments. The former are utilized to take injured



Manner of Hauling Ashes at the Pacific Mills, the Five-Ton White Truck Being Loaded by a Mechanical Carrier and Instantaneous Filling and Dumping Scoop, This Economizing the Time of the Machine and its Crew.

except by his instruction and each man has a schedule to work to. If the truck should be distributing the time is noted when it should be at each station on the outward or inward trip. From all mill departments orders for haulage are telephoned the dispatcher, who can state when the vehicle will arrive and will know whether or not the order can be filled by regular work. If necessary he can assign a special truck for the job. While a truck may stop at all of the 35 stations, it may not be necessary to take off or put on freight at more than two or three during a trip, but each driver telephones the dispatcher from specified stations and receives whatever orders may have been accumulated after the start was made. So it will be seen that the service is scheduled as are trains.

If the driver does not reach the stations on time, or he is delayed, he must explain his delay, and immediately the responsibility for the retardation of the service is sought. No matter whom or what the cause emphasis is made that a repetition cannot be tolerated persons to hospitals in the place of backs that were once hired, besides doing emergency calls of all kinds. A good deal of the time of the five-ton truck is taken up hauling ashes. At one time the ashes were removed by the city teams, a work that was uncertain and unsatisfactory, but now the company delivers ashes wherever they are wanted for any purpose, making a charge for the haulage.

At the expiration of each day the dispatcher's records are sent to the "store" office, where the other records are kept and from these the exact service of each machine can be ascertained.

Each driver, at the conclusion of his work, makes out a report that requires the solometer reading at 6 in the evening, the quantity of gasoline, oil and grease taken, and the work performed. In addition to this he is required to specify the accident, cause of accident, the time stopped by an accident, the time stopped from any other cause and the supplies bought and the repairs made during the day.

	PACIFIC N	MILLS	
		No	
	Tel. Order from	Dispatcher.	
	M.	19)
AMPROVED TO SERVICE OF THE SERVICE O		Cha	uffeu
Go to			
-			
Return	this to STORE O		г

Parm of Telephone Order to Pacific Mills Drivers, to Be Filled in page Receipt of Instruction from the Disputcher

The machines are delivered to the garage at night and there they are given whatever attention is necessary by the machinist, the electric machines are charged, and the replenishments are made. The adjusting, oiling, greasing and the like is done at night, and, of course, the batteries are examined, tested, equalized and charged during the same time.

Although the hauls are extremely short as an average the manner in which the trucks are worked results in daily mileage that is surprisingly large and will very frequently exceed what would be made by machines engaged in what is regarded as long haulage. The secret of the success of the company in operating trucks in its service is keeping them busy, and this has been made possible by a system that ought to be equally practical and satisfactory wherever adopted.

This system has made possible a saving of approximately 20 per cent, as compared with the cost of horse service under conditions where it might be assumed horses would demonstrate their greatest economy. Assuming that horse cost is the standard by which to measure vehicular service capacity, and regarding that as the unit, it will be understood that the Pacific Mills is paying but 80 cents for work that would cost \$1 with horses, and basing a conclusion on the assumption that horse work is found to be from 10 to 25 cents cheaper by many who have or are using trucks for short hauls, it can be said that the efficiency of the system represents a saving of not only the 20 per cent, but the difference between the cost of truck work, whatever that difference may be.

The Pacific Mills horse service was well organized and directed. It is probable that it would show considerably less operating cost than the average installation. To save 20 per cent, of horse service cost is a remarkable showing. Contrasting this service with those of others who have used motor vehicles and continued animal methods, it is apparent that system can be as efficient and as productive in haulage as in any other work. The trucks have the capacity, but they must be operated with intelligence.

Motor truck dealers and manufacturers in California, it is reported, are taking musual interest in the automobile show to be held in connection with the convention of the California League of Municipalities at Berkeley this fall. Models of practically every kind of a machine that may be used effectively in municipal departments will be placed on exhibition.

	PACIFIC MILI	LS.		11.0
Report fo	AUTO. Pac. No.	For	19	•
Odometer register at 6 P. M. today	Gasoline	Oil	Grease	taken
Work	done:			
See other side for report of accident, cause of name				
				Chauffe

Daily Report for Drivers in the Pacific Mills Truck Service, Farm 7.5 by 3.5 Inches, on the Reverse Being Printed the Fullowing: Accidents, and Cames of Same; Time Anta Was Mapped from Accident or Other Cames, During the Day, and Supplies Bought or Hepairs Made, with Space for Entry by the Driver.

BOSTON'S GREAT ELECTRICAL SHOW.

THE electrical show to take place at Mechanics' building, Huntington avenue, Boston, Sept. 28 to Oct. 26, inclusive, directed by H. W. Moses and under the auspices of the Boston Edison Electric Illuminating Company, will be, it is promised, the largest exhibition of the kind to take place in the world. The display will occupy the entire exhibit floor space of 1055-000 square feet and it will include every possible demonstration of the uses of electric energy for power, lighting, nanufacturing, transporting, scientific and domestic purposes. Every manufacturer of electric prime movers, lighting installations, power tools and domestic utensils and implements of consequence in the country will be requesented.

The splendid department to be devoted to electric pleasure cars and service wagons, which will be a feature throughout the period of the display, will be the first representative showing of these vehicles to be held in America. There are in all approximately 35 con-



The 3.5-Ton General Vehicle Truck in the Service of Gutterson & Gould, Junk Denier, Lawrence, Mass.

cerns producing either class or both classes of these machines, and it is stated that all of these will be represented. While there will be a very large number of vehicles of all kinds, it is believed that the showing of wagons and trucks will have the greatest attraction for the public because of the undoubted value of electric wagons for highway transportation.

It is pointed out that the public has manifested remarkable interest in the service obtained by the users of electric vehicles, and it is held that while there are limitations as to the work that can ordinarily be performed by them, there is but a comparatively small volume of haulage in which the electric wagon or truck cannot be profitably employed.

While there will be the display of the machines made in the building, which will include chassis with and without body equipment, as well as parts, and all forms of vehicle conveniences, the visitors will have opportunity to see trucks and wagons in actual service. This will be made possible through the fitting of a large section of the basement as a model electric garage, even to the smallest requirement, where as many of the vehicles of different makes as can be accommodated will be garaged. This garage will be conducted to a system which has been specially devised and is regarded to be the most complete and satisfactory in existence.

This garage will be in operation day and night, and as the machines will be in use during the day the visitors will have opportunity of observing the attention given to battery charging, maintenance and repair, work of all kinds upon the vehicles as occasion may require, and the regular attention afforded by a garage when the machines are brought in for the night. The work will be in charge of an expert and he will be assisted by capable men. It is expected that there will be demonstration of different work that may be required, such as care of motors and controllers, and in addition there will be exhibition of equipment and appliances useful in a garage.

The purpose is to illustrate what is really necessary and desirable in the use and care of electric wagons, to show what should be done to obtain the largest degree of efficiency with the greatest economy, and to insure practical and continuous service. will be the first time in America, and probably in the world, that an exhibition of this character has taken place, and all of those producing vehicles have united in an endeavor which promises to be as largely productive of good results as it will be an educational factor. The Electric Vehicle Association of America and the Electric Vehicle Club of Boston are co-operating with the management of the show and each organization is devoting its influence and energies toward promoting general interest in the showing and demonstration of the vehicles

ELECTRIC TRUCK IN JUNK HAULAGE.

Experience of Lawrence Dealer Indicates Vehicle Will Displace Five Horses in This Work.

A decidedly unusual use for an electric truck is junk hullage, a service in which Gutterson & Gould, Lawrence, Massa, is operating a 3.5-ton G. V. machine. The concern is the largest of the kind in that city and it deals in any form of metal and paper stock. The company has contract with a number of the large mills to take useless machinery or metal construction or stock of any character, which requires intermittent haulage, the service being dependent upon the accumulations. Under ordinary circumstances the junk is bought for a lump sum and is removed as quickly as possible. The material may be of a nature that makes a very bulky load, or it may be comparatively small and heave.

For years the company used horses, it not being believed that any other form of transport would give equal satisfaction and results. The first of September last the electric truck was placed in service and it was placed in competition, so to speak, with a contractor who was hauling material for the company. This man owns his own equipment, has an exceedingly fine pair of horses, and drives them himself. Not only this, he is an musually hard and energetic worker. The combination gives horse equipment of unusual efficiency, and the company has no investment and does not lose time when the animals are idle. It actually pays for nothing more than it receives, and because of regular work the owner of the horses is content to receive a price less than might be paid for occasional work.

Not only this the hauls are generally comparatively short, being seldom more than four miles, and because of the character of the loads, which must be handled and packed for haulage, and unloaded and piled at the yard, the time required is more than would be necessary for practically any other work. But despite this the machine has been a distinct saving, according to Mr. Gutterson, who says that it has been all that it was represented to be, and then some. He says that he knows nothing about what maintenance cost would be

duction of electric service wagons, has placed in the market a 1000-pound wagon that is intended for delivery purposes, the body being designed for carrying light and bulky packages. The body is solid and cannot be opened at the rear, this being regarded as a provision against theit or loss, and instead of the usual height of 60 inches there is full head room, so that a person within the body, while sorting or packing the load, may stand erect. The vehicle is created for meeting a demand from concerns having large delivery systems and it is believed that it will serve a distinctly useful purpose.

ELECTRICS BY THE TRAIN LOAD.

Baker Company Fills Order That Requires 10 Flat Cars to Transport.

The Baker Electric Vehicle Company, Cleveland, O, recently shipped an order or rather part of an order, of two-ton wagons to the American Express Company that required 10 flat cars to carry, there being 19 of the machines in the shipment. The accompany-



A Train Load of Electric Trucks Consigned to the American Express Company, This Being a Single Shipment by the Baker Motor Vehlele Company, Cleveland, O.

because the machine has only been out of commission two-days, and this for a broken jackshaft, and he does not know what his tire cost will be as he is still using the original shoes, while he has an arrangement for garaging and attention which makes his cost comparatively small.

Regarding the work that the truck has done, Mr. Gutterson says that contrasted with the service ordinarily afforded by horse vehicles it has been in every way equal to two two-horse teams and a cart, and that if the men who man it will do the work they should it is the equal of 2.5 teams. But the loading and unboading is a distinct handicap, for there is no saving in this labor because of the nature of the freights. As to the results with the machine in winter, he says that it was driven every day through all sorts of weather and road conditions, and under all circumstances it was in every way efficient. The average mileage is about 35 daily.

The Kentucky Wagon Manufacturing Company, Louisville, Ky., which is actively engaged in the pro-

ing photograph was made while the train was in the freight yard and it is decidedly interesting, it being probably the first time so large a number had been sent out. It is maintained by the Baker company that the order from the American Express Company is the largest eyer riven a yellock manufacture.

When the orders now in hand shall have been filled the American Express Company will have Baker machines in its service in 18 different cities, these being New York, Chicago, Boston, Dallas, Portland, Me.; Springfield, Mass.; Buffalo, Milwankee, Lawrence, Mass.; Kansas City, Memphis, Worcester, Mass.; Syraense, Rochester, St., Louis, Cleveland, Cincinnati and Los Angeles.

The Lausden Electric Vehicle Company, Boston, of which concern H. E. Tagbor is sales manager, has setablished itself at 242 Columbus aceuue, where well equipped salestooms have been opened. The company is engaged in the distribution of Lausden electric service wagons in Boston and other points throughout New England.

BOSTON'S EXCLUSIVE ELECTRIC GARAGE.

B OSTONIANS have been slow as compared with the people of other sections of the country in utilizing electric vehicles, and this comment applies to both pleasure and industrial conveyances. So far as pleasure machines are concerned the probable reason is the admirable roads stretching in every direction that invite and impel long distance touring. Another reason is that for years few agencies for electrics had been established and there was little or no activity in demonstrating the utility and economy of either cars or wazons.

Boston is today, however, realizing the value of the electric machine for all purposes, and through the cooperative promotion of the members of the Electric Vehicle Club, and by this organization and the Edison Electric Illuminating Company of Boston there has ed by the manufacturers of other types of machines was a decided handicap to business. Men who seriously considered electrics believed that it would not be practical or profitable for them to establish and equip a garage for one or two wagons, and they demanded the same facilities that were provided for gasoline vehicles.

With the formation of the Electric Vehicle Club and the united interest of the members, and the cooperation of the Boston members of the Electric Vehicle Association of America, it was decided that business interests demanded the establishment of a garage and the Edison Electric Illuminating Company offered to establish such a station and substantially assist in its support until it became self-sustaining. A committee was annowined to represent the Electric Vehicle As-



The West End of the Floor of the Atlantic Avenue Electric Garage, Boston, Mass., Showing a Truck on the Washstand and the Others Stored About the Foreman's Office and Operating Room.

been inaugurated a systematic and harmonized campaign that has been productive of admirable results. As might be assumed, there is no public service station in Boston devoted exclusively to pleasure vehicles and there is but one that has been equipped to give special attention to electrics, although a considerable number essay to afford a general service for all types of machines. But with all of these patronage has been sought from owners of every class of vehicle.

There are a number of owners of electric service vehicles who have their own garages and who have equipment and facilities for charging the batteries and doing ordinary work on their machines, they depending upon the agents or upon other sources for service or attention they themselves cannot give. When the endeavors of the electric service wagon agents began to bear fruit it was found that the lack of a station where contract could obtain service such as was provide

sociation of America to take charge of the garage proposition and to organize, establish and conduct it, this committee consisting of Day Baker, New England manager of the General Vehicle Company, as chairman, and E. S. Mansfield of the Edison Electric Illuminating Company and Frank J. Stone of the Electric Storage Battery Company as the other members.

This committee was empowered to earry out the plan and it was insured the assistance and co-operation of the different organizations and their members. Because of the interest of the Edison Electric Illuminating Company in the station and the work it was intended to accomplish it was but natural that it should be actively represented in its conduct and activities. Mr. Mansfield being made the manager, he having charge of the finances and the administration, nominally under the direction of the committee. As night he assumed the purpose of the committee and the mansumed the purpose of the committee and the man-

agement was to afford such a service as experience dictated would be necessary and desirable to stimulate the use of electric vehicles, and to make possible the highest efficiency of the machines that were garaged in the station.

It was realized that immediate gain must be sacrificed and that the energies of the garage management be directed toward general promotion of service and clucation of the public to the advantages of the electric wagon. It was maintained that much depended upon the charging of the batteries and the scientific attention that should be given to insure maximum life and endurance. Education of those who were users of electrics to the systematic care that would be productive of results was the chief object, and it was believed that when the capacity and economy of the wagons was understood there would be willingness to pay reasonable prices for high class and scientific attention.

Such was the reason for the establishment of the

venient to the railroad and steamship terminals. The garage is reasonably near a majority of business houses that might be interested in electric vehicles and is not remote from a number of the large industrial establishments. It was originally a garage for both electric and gasoline vehicles. The structure is a single story, of concrete, and it extends east from Atlantic avenue with a drive beside it. The building is about 50 feet in width and that part now utilized is about 100 feet in length, giving approximately 5000 square feet of floor area. The building is about 300 feet in length and it is intended to give all of it over to the garage when the capacity is increased. The roof is flat and about 30 feet above the floor, there being good lighting from the windows and skylights. There are two series of iron pillars supporting the roof, but these posts are not sufficiently numerous to interfere with satisfactory or economic arrangement of the wagons, although the ideal garage has a perfectly clear floor, and absence



The East End of the Floor of the Atlantic Avenne Electric Garage, with the Machines Stored in Raws, the Repair Bay Being Under the Balcony Seen at the Extreme Background.

Atlantic Avenue Electric Garage, 476 Atlantic avenue, Boston, and the policy of its conduct. In the first few months the patronage developed apparently very slowly, but it increased substantially and this with reference to constant and transient custom, and while growth has been gradual it has been none the less satisfying. The garage was planned with a view to expansion, it having now capacity for 20 machines, but under ordinary conditions from 23 to 30 are crowded into it, and occasionally all cannot be sheltered. It is now planned to increase the garage to three times its present capacity, probably during the antumn, and when this is done the garage will have storage space for nearly 100 vehicles and adequate facilities for charging and maintaining them.

The garage is in a building placed at the disposal of the committee by the Edison Electric Illuminating Company, and it is ideally located, being in the wholesale district of the business part of the city and conof obstructions facilitates the handling of the vehicles.

The purpose in fitting the garage was to demonstrate to those who might be interested in electric public service stations as business enterprises that it was not necessary to have elaborate or costly equipment, but it was imperative to have simple and efficient facilities so that the quality of service should be the highest and maintained at a standard known to the public. Artistic effect was lost sight of, but there is a very practical impression upon every visitor. In announcements to the public it was stated that it was not the purpose of the garage management to enter competition with other stations where customers were receiving satisfactory attention, but it was intended to provide a station for the benefit of owners within a reasonable radius and to afford the best of service to those who could not procure it elsewhere.

The plan of service adopted was to make a flat rate a vehicle a month, this single charge covering storage, electric current irrespective of mileage driven, battery testing, battery enablizing, oiling, greasing, adjustments and minor repairs, washing and polishing, with advice by experts when desired. It was also purposed to undertake any work of restoration or repair, including motor and controller upkeep, battery examination and renewal, lead burning, replacement of electric lights, renewing worn or broken parts, and to provide and install tires at the regular commercial prices. It was further emphasized that there would be machines always ready for towing in the event of accident or failure, for which reasonable charges would be made, and that these would be available for hire should vehicles be withdrawn from service for painting or repair.

The charging installation was important and this consisted of two General Electric panels, each having mounted on it six charging switches, indicating instruments and General Electric charging rheostats, through which the current is carried to Auderson



The Office and Operating Room of the Atlantic Avenue Electric Garage, Showing the Charging Panel, Which Has a Capacity of 12 Machines.

charging receptacles or charging lines conveniently located. The current is obtained from a direct current three-wire main. This permits charging 12 vehicles at a time, which was believed to be as great a number as would be receiving attention simultaneously. It may be said, however, that with the present patronage the charging loard is not by any means sufficient, and with the culargement of the garage the capacity will be increased at least three, and probably four, times.

The arrangement of the garage is a parallelogram with its length east and west. The drive is at the south side and the two large entrances are from that side. These doors are often opened to afford maximum light. In the northwest corner is the operating room, which contains the charging pauel and switchboards, and in this is the office of the superintendent and the clerk. This room is divided from the main floor by a half-partition surmometed by a wire sereen. Next south of this is the washstand, and becond the washstand is

floor space available for storage, a section of which is devoted to battery care and maintenance.

About 20 feet from the east end the floor is dropped about 18 inches and in this area practically all of the repairing is done. In the southeast corner is a panel for charging ignition batteries. Along the wall extends a work bench, and beyond this is a flight of stairs leading to a mezzanine floor. Under the staircase is a large closet in which oil and grease are stored. On the mezzanine floor is a stock room in which parts for several makes of vehicles are carried, and there is a room fitted for the convenience of the drivers with tables, chairs and lockers for their individual property. The remainder of the floor space is devoted to the storage of machines. There is a very good equipment of such hand tools as are useful, but aside from electric drills there are no power tools. There is an arrangement with a high class machine shop, however, which will produce whatever special work is necessary either nights or Sundays, and this has been thus far more economical

> than to install machines that would not be constantly productive. The garage is lighted by Mazda lamps fitted with holophane reflectors.

In the records of the garage operating and maintenance data are kept in detail so that it is possible and practical to compute exact costs of all descriptions for the information of the customer or for the purpose of making commercial comparisons. While the patrons still have the benefit of the flat rate for service charge, it can be said that the garage is now self-sustaining and has become firmly established.

The attention given has been outlined. When an owner desires the garage service he is required to state whether he, or his driver, or who, will give orders for work other than is called for under the head of reg-

ular service maintenance. In some instances the superintendent of the garage is instructed to use his judgment as to what had best be done. All work, however, must be authorized. Under the system when a driver reaches the garage from his day's work, if his car needs any attention aside from that usually given, he notes on a blackboard his report and the condition as he has observed it. With this report as a guide the superintendent or the night foreman makes examination and if authority is necessary it is sought and obtained.

The order is then made out on a blank form which specifies the order number, the kind and quality of work to be done, and the name of the workman who is to perform it. This is stamped with a time clock stamp when the work is begun and it is similarly stamped when the work is completed, each blank having space for two beginning and two finishing stamps. This provides for an interruption of the work. On the back of the order is a space for explanation under the head of

"remarks," The total time in hours and minutes is noted on the order when the work is completed. In the event of stock or parts being used these are withdrawn from the stock room by requisiton and the price is charged to the job by order number and by the name of the owner. The amount of the bill is the charge for material or parts plus the amount for time. In addition to the record of the order each workman keeps a time card record that is handed into the office at the finish of work for the day or night. This time card gives the name of the workman, the date, the name for whom the work was done, a brief description of the work, and the number of hours occupied with the work, each separate job being specified. The time cards and the order record ought to coincide as to hours worked. If the workman is engaged in regular service work this is indicated by the time card.

For any repair or restoration aside from the regular service the prices for materials or supplies are established. In some instances work might be underly complete records are made. There are two forms of report, the one for service of the garage and the other for use with vehicles owned by the Edison Electric Illuminating Company. Considering these reports it will be understood that record is made separate for each vehicle. The garage form differs from the private form in that the latter includes the number of the battery, the watt meter number, driver's name and road conditions, the last being a note of dry, mud, rain, snow, ice or other condition that might be reflected in the performance of the machine. The odometer reading is merely the total, which indicates the daily mileage. The actual times of charging, the voltage and amperage from time to time, and the name of the observer, with remarks, constitute the report.

The garage form is even more complete in that it indicates the name of the owner, the reading of the odometer for out and in and miles, and the circuit number on which the charge is made. The times of charging, the voltage, the amperage, the line voltage and the spe-



Parms Leed at the Minute Avenue Electric Garage: Upper Left, Workman's Time Card; Lower Left, Order Blank for Extra Work; Centre, Edina Electric Hinminating Company's Charging Blank; Bight, Garage Battery Charging Report.

taken for a given price, but this is seldom done.

Under normal conditions of service the machine when brought into the garage is immediately placed on charge. When it is washed the charging is stopped and when the washing is finished charging is resumed. Then later in the night the metal is polished. Usually each machine is oiled and greased every other night, or three times a week, and once each week an inspection is made of the nuts, bolts and cotter pins, the wearing parts are examined for wear, and the motor and controller are looked over. Adjustments and the like are made immediately when need is noted and if there is a condition developed that requires attention the owner is notified. His instructions are awaited. The batteries are inspected with great care and whenever necessary are equalized and brought up to the standard. In the event of need a battery may be removed for restoration and replaced temporarily by another.

In charging the batteries unusual care and extreme-

cific gravity are required each time an observation is made. Both forms show the ampere-hour meter readings and the wait meter readings at start and finish, and the number of kilowatt-hours represented by the charge. It will be noted that the blanks require numerous readings and more careful observation of the charging than is recorded on the general charging sheet, information that can be put to very good use.

The service afforded the patrons is thoroughly good. It is maintained to a standard that is desired by those who sell electric machines, who claim that the greatest efficiency is productive of the greatest economy in actual work accomplished and minimizes expense. They insist that efficiency means better service and greater endurance of the vehicles, and that in promoting the use of electrics it is, after all, the user who is the direct beneficiary, because without the education the garage affords it would be impossible to have general application and use of common sense ideals.

THE VC 3000-POUND TRUCK CHASSIS.

THE VC Motor Truck Company has been organized at Lynn, Mass., and has begun the manufacture of a 3000-pound delivery wagon. It is proposed to begin delivering these machines Oct. 15, and the production will be on the basis of 100 machines the first year. A factory site close to a railroad is available, an option on the property has been secured, and if conditions shall justify the company will be able to establish its plant in a comparatively short time. If the present purpose is realized the company will have its works, with admirable equipment and facilities, ready shortly after the first of the year.

The company has capital stock of \$100,000. Its organizers are Frank E. Vallier, a well known shoe leather dealer of Lynn, who has been for seven years in the automobile business in that city, being agent for Essex county for the Jackson car, and since 1909 agent for the Velie car; Frank S. Corlew of Brookline, Mass,

from the company and the copy to be kept for record, which will indicate the conditions of use and upkeep and whether or not the recommendations have been followed. The men will keep the company informed of their whereabouts and will be generally available at any time when needed, as one of the requirements of the guarantee is that all work on the machines be performed by men who understand them and will not experiment. The intention is that factory service will be given, and to a degree that will insure to all purchasers the use of their machines at all times, through the prevention of conditions resultant from ignorance, neglect or abuse. It is maintained that no section of the country in which the company will be represented is more than a few hours' ride distant, and that it will be possible to supply parts or have an expert in attendance in a comparatively short time. The policy of the company is summarized in the phrase"New Eng-



The Chassis of the VC 3000 Pounds Capacity Machine, Without Driver's Nest, Showing the Control Members.

widely known in the automobile industry and trade; John P. Stevens, of Burley & Stevens, shee manufacturer, Newburyport, Mass.; W. T. Langmaid, of the Essex Taming Co., Peabody, Mass.; John N. Nelson, Lynn, Mass., druggist; Charles A. Alley, Lynn, real estate dealer; J. P. Croscop, Mr. Valler's business partner, and S. D. Ritcey, Lynn, leather manufacturer. Other well known business men of Lynn are interested. The company has ample resources, and its policy is to confine its activities to New England and New York state and to establish in connection with its agencies service stations which will afford to the owners of its vehicles systematic and constant attention.

Weekly Inspection in Service.

The plan contemplates the weekly inspection of every VC machine by men who will travel by motorcycles, carrying such tools as will usually be necessary for ordinary work and adjustments and who will be competent to undertake and direct whatever attention may be needed. These men will make written report in duplicate, the original to go to the owner land Made for New England Trade," and it is believed that with the assurance of the service outlined and the high quality of vehicles produced, purchasers will be in every way satisfied.

The machine is designated as model B and it has been designed for hard service. It is intended for service where moderate boads and comparatively fast speed are required, and it has been tested under conditions where the work has been unusually severe and in every way in excess of what would be required in what may be regarded as excess service. But one chassis will be built, and there will be no changes unless a refinement has been determined as in every way desirable. That is to say, standardization is sought from every noint of view.

Motor Construction.

The motor is a Continental, four-cylinder, fourstroke cycle, water-cooled, vertical, L head type, with the cylinders cast on bloc with the water jackets and the intake manifold integral. The bore is 3.75 inches, the stroke 5.25 inches and the bore to stroke ratio is 1



The Wheel, Brake, Radius Rod, Spring and Axle Assembly, Showing the Means of Adjusting the Henry Emergency Brake Shors.

to 1.40. The material is a special grade of reverberatory air furnace iron, the cylinder heads and the base flanges being unusually heavy. The block is tested under a heavy water pressure to locate defects and after boring it is aged to eliminate easting stresses. Aiter reaming and grinding to size the block is again subjected to a water test. A special process is followed in removing from the water spaces all fins, core wire, sand, scale, etc., so there are no obstructions to the water circulation. The large opening in the head of the water jacket is closed by a channelled plate which carries the outlet at the front or deepest end of the channel, this plate being retained by a series of capscrews. The block base flange is extended under the valve pockets and at either end of the block is a web. and between the recesses thus formed for the protection of the valve mechanism is the intake of the fuel manifold. The S. A. E. rating is 22.5 horsepower, the claim of the manufacturer is 30 horsebower at 1000 revolutions a minute, and that at 1500 revolutions 42 horsepower has been developed.

The aluminum alloy crankcase is longitudinally divided, the upper section having the supporting arms at either end and a central transverse web. This half carries the main bearings. The lower half is divided by a transverse horizontal web that contains four transverse channels. Below this is the oil reservoir of six quarts capacity. The lower section may be removed readily for work on the crankshaft and crankpin bearings. The pistons are of the same grade of metal as the cylinder block, five inches length, and are turned and ground to accurate fit. Each piston is fitted with four .25-inch eccentric expansion rings, bevel split, ground on the edges and peripheries. These are carefully tested for compression. Inside the piston are five oil grooves with leads that lubricate the outside piston and the cylinder walls. The wristpin bosses are very large and in these the wristpin oscillates.

The crankshaft is a three-bearing type of .35 to .45 carbon steel, drop forged and heat treated, with tensile strength of 90,000 pounds to the square inch. Flanges take the end thrust. The bearings and the crankpins are 1.75 inches diameter and the bearings are

respectively 275, three and four inches length for the front, centre and rear. This gives 975 inches total length bearing surface. The bearings are of nickel babbit and are held by brass retaining screws. The connecting rolds are drop forged steel, 10.5 inches length, I section, beat treated, bored and reamed on special machines to insure alignment. These have big end bearings 2,5 inches length, of nickel babbitt, the caps being each retained by two nickel steel bolts with bocked nuts. These are fitted with shims for adjustment for wear. The wristjins are hardened steel, accurately ground, clamped in the connecting rod small ends by one bolt. The bearing surface in the piston bosses is very large.

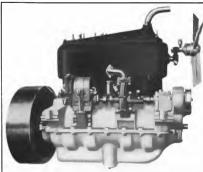
The camshaft is a low carbon steel drop forging with the cams integral. After turning and rough machining the cams, the shaft is annealed and heat treated, and is then finish ground on a special machine. The camshaft diameter is 10.025 inches, with the bearings of nickel babbit trespectively 2.25 inches diameter and 1.315 inches length, 11.25 inches diameter and 1.25 inches length for the rout, centre and rear inches length for the iron, centre and rear inches length for the iron, centre and rear

The valve ports are two inches diameter and the valves are inched steel heads and carbon steel stems, electrically welded. The valve seats, heads and stems are carefully ground. The clearance insures the complete seavenings of the cylinders and the influes charges of fuel. The valve stem ends are hardened. The valve printings are oil tempered. The valve guides are cast iron bushings. The valve tappets are case hardened chrome nickel steel of mushroom type, accurately ground, which operate is cast iron guides-seated in the cylinder flange. The upper ends of the tappets are fitted with steel adjusting screws and mits.

The timing gears are alternately east iron and drop forged steel, helically cut on automatic hobbing machines, and the set consists of crank, can, pump shaft



Hear View of the VC Channin, Dispinying the Heavy Frame, Axie, Jackshaft and the Undersinag Apring Countraction.



The Right Side of the VC Notor, Showing Magneto and Water Pump Drive, and idler years. Especial attention has been given to brake to make to brake
and idler gears. Especial attention has been given to the maintenance of gear centres and noise is practically eliminated. These gears are housed in an extension of the crankcase by a cover plate.

Combination Lubrication System.

The lubrication system is a combination of splash and force feed, two plunger spring returned pumps actuated by eams on the camshaft forcing oil to the rear main bearing and the timing gearcase through separate leads. The drainage from these is to the oil pool in the engine case and thence the overflow is to the oil reservoir. The lubrication of the main, crankpin, camshaft and wrispin bearings, and of the

cams, valve tappets, piston and cylinder walls, is by splash from the sweep of the scoops on the connecting rod big ends in the oil pool. The oil is effectively filtered.

Cooling System.

The motor is cooled by a circulation of water through the motor water spaces by a centrifugal pump driven by an outside shaft on the right side of the engine. The inlet is at the base of the water jacket space and the outlet is through a large curbed brass outlet to the big cellular radiator. The radiator is mounted on a Mercedes type of ball trunnions which eliminate all stresses upon the cooler. The capacity is 6.5 gallons. Radiation is assisted by a fourbladed steel fan mounted on an adjustable ball bearing bracket on the forward end of the cylinder block, driven by a flat belt from a pulley installed on the extension of the camshaft.

The ignition is by a Bosch magneto

located at the right side on a bracket and driven by an omtside shaft that operates the water pump. There is a battery of dry cells from which a current is supplied through the transformer cell located on the dash under the hood, where it is fully protected. There is our set of plugs located in the cylinder block above the inlet valve.

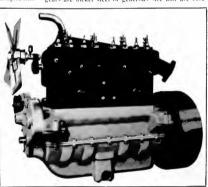
The fuel is atomized through a Schelbler model D carburetor, an automatic float feed type, that has been particularly adapted to this motor, affording a uniform mixture at all engine speeds and under all conditions of operation, insuring exceedingly economical service.

Clutch and Transmission.

The flywheel is cast iron, 17.5 inches diameter and four inches face, botted to a flange on the crankshaft. The clinich is of the cone type with a facing of Rayhestos that insures ease of engagement and positive action without slipping. The clinth is fitted with a

brake to prevent spinning and to protect the transmission gearset gears when changing speed ratios. There is a ball bearing that takes the thrust of the elutch spring. There are two universal joints between the clutch and the main shaft of the gearset, which e-mpensate for any distortion of the chassis frame. Liberal grease cups are provided for hibrication.

The transmission gearset is a selective type with three forward speeds and reverse and it is supported at the forward end by a cross member, and at the rear it is bofted to the jackshaft housing. The shafts and gears are nickel steel of generous size and are care-



The Valve Side of the Motor of the VC Chassis.



Frederick Byron, Impector of the VC Motor Truck Company, Responding to a Call on His Motorcycle.

fully formed, the spin gears being cut and finished with nuch care, and they are both leat treated. The shafts are mounted on New Departure annular ball hearings. A large cover plate, easily removable, affords access to the shafts and gears. The control levers are carried in a very heavy east steel bracket that is mounted at the rear on the sub-frame and forward on the crossshaft that supports the clutch and brake pedal cranks. The lever quadrant is of the 11 type.

The jackshaft is contained in a pressed steel housing that contains the differential gearing. This horsing is supported at either end by heavy brackets that are combined with the spring hangers and by bosening the retaining botts the jackshaft may be dropped from its supports. The brackets have very large bearing surfaces and these are of the globe type in which the housing may move under stress of chassis distortion. The bevel gear is extra size and the gear and the differential pinions and gears, are of nickel steel. The differential is mounted on New Departure annular ball bearings. The adsebafts are nickel steel, 1375 inches

diameter, hardened and heat treated. The outboard jackshaft bearings are New Departure annular ball type. The reduction chains to the rear wheels are a detachable form of standard make

Rear Axle Construction.

The rear asle is a steed drop forging Z852 inches width and 2.875 depth with the spring seats integral. The radius rods are fitted on bearings on the asle and are attached to the jackshaft bousing with serew and lock nut means of adjustment. The rods are of unusual strength. The front axle is a heavy 1 section drop forged from nickel steel, with large yokes. The steering privots are extra size and are nickel steel. with hardened steel bushings and ball hearings. The wheel spindles are niked steel and are fitted with New Departure annular ball bearings. The tail lever and drag link are steel drop forgings, and the take in bar, of similar material, is placed behind the act for protection. There are means for adjustments to compensate for wear.

The frame is a hot rolled low earhon steel, pressed cold, channel section, 25 inch thick, 4.5 inches depth and four inches width. There are two heavy cross members and the rear member is strongly braced with long diagonals. The forward spring horns are heavy steel drop forgings bolted to the frame. The forward cross member effectually protects that radiator. The springs are semi-clliptic. The front set is 42 inches length and 2.5 inches width, with 10 leaves. The rear set is 48 inches length and 2.5 inches width, with 4 leaves, those being underslung and having an unusual arch to insure extreme ease of action. They are of silico-manganese steel. The forward springs are shackled at the rear, and the rear springs at both ends, the drive being through the radius role.

The sterring wheel is at the left side and the gear is an irreversible type in which the construction is completely enclosed and is oil tight, with adjustments practicable at every wearing point. The wheel is 18 inches diameter, with a five-spoke spider and a steel rim covered with hard rubber. The spark and throttle leversare on the steering column under the wheel.

Brakes, Etc.

The clutch is actuated by the left pedal and the service brake by the right, the pedals being of unusual size. The leverage is powerful and the operation of both clutch and brake requires comparatively little pressure. The service brake is an external contracting type, the shoes being lined with Raybestos and contracting on a steel drum 14 inches diameter and 2.5 inches face botted to the spokes of the rear wheels.



Inspector of the AC Motor Truck Company Putling on a Spredameter. His Motorcycle Ready for Instant Use.

The emergency brake shoes are faced with Raybestos operating within the drums. The brake drum is not closed by a flange carried on the axle or the radius rod, but is open, and the emergency brake is adjustable for wear by a toggle lever that is mounted on the radius rod and may be changed to secure any desired clearance by changing the pin on which it is carried. It is kept clear of the brake drum by a spring. The service brake is also mounted with the lever carried on a pin on the radius rod. Both brake rods are adjustable as to length by screws and lock nuts. The wheels are artillery type, of second growth hickory, 36 inches diameter, fitted with demountable tires, the make being optional with the purchaser. The wheelbase is 130 inches and the tread is 56 inches.

In the design provision is made for carrying a body weighing 700 pounds and a load of 3000 pounds, the weight being 40 per cent, on the front wheels and 60 per cent, on the rear wheels. The dash is of wood. The gasoline tank is a steel cylinder under the driver's seat and has capacity of 20 gallons, three gallons of which is reserve. The tank is champed to the frame by



Porm of Standard Cantion Plate Recommended by National Association of Automobile Manufacturers.

heavy straps and may be located as desired.

The weight of the chassis is 3540 pounds. Mudguards are furnished for the front wheels and the running boards are short, the brackets being braced by two cross stays below the frame. On one running board is the tool box and on the other the battery box. The equipment includes two dash and one tail lamp. The usual isck and the tool kit are also sumplied.

Throughout the chassis is the evidence of careful design. Great care is taken to insure lubrication of all moving parts and steel grease cups of liberal proportions are provided; there is a large bracket with a long bearing for the starting crank; the radiation system is 25 per cent. larger than the average for machines of this size; there is a stout bumper to protect the radiator; the front spring horns are extra heavy; the control lever bracket is practically unbreakable; the steering gear is very heavy; the frame is unusually stiff and strong, and every part is very accessible. The engineroad whele revolution ratio is eight to one on direct drive, 12 to one on intermediate, 24 to one on low, and 20 to one when reversed.

The chassis has a loading space back of the driver's scat 113 inches length and 48 inches width between wheels, and the body may be increased to any desired length or width by overhanging the chassis and placing a bolster upon it.

REGARDING CHASSIS RATING.

Commercial Vehicle Committee of National Association Answers Correspondent.

In the August issue of MOTOR TRUCK, Morris R, Machol, general manager of the Hydraulic Truck Sales Company, New York City, discussed at some length the matter of chassis rating, with reference to the type of body fitted thereto. The following communication is in the nature of a reply, Mr. Machol having expressed a desire that the subject be thrown open to general discussion:

Editor, MOTOR TRUCK.

Sir:

The letter from Mr. Morris R. Machol, published in your hast issue, in which he makes objection to the rating of rouch chassis by tonnage capacity without rotard to the weight of commerciat whether committee of the National Association of Automobile Manufacturers in connection with the allied subjects of body weight allowance, overload and atandard caution

Mr. Muchol's criticisms of chassis ratings breapertive of body welchts are well taken, as it is obvious that the weight of the body has a great dood to do with the safe useful load capacity, equally pilat, however; the chassis rannot be rated by act to currying capacity, breause the chassis is do the not will obtain to the file. Inside of the chassis has been also seen to the contraction of the

Under the conditions, it seems as if the fair way is to rate the chassis by gross capacity, including body, as, "capacity, five tons with body." This leaves the buyer no excuse for assuming that the anaker guarantees the chassis to carry five toss in addition to the body, whether it is an open stake body or a heavy closed van body weighting a ton or two.

It is to bring about a better understanding of just such points as this that the commercial vehicle committee of the N. A. M. has been giving much altention to truck ratings, warranty, body weight allowances, caution plates, and so on.

ranty, and person in the safety, this capacitation is a state of the control of the form of caution plate recommended at the June 4 convention of motor wagen makers, copy of which ha shown on page three of the minutes of he menting enclosed. You will note that provision is made for stamping in with dies the standard pacity and the total weight on the scale ode, the set load concity and the total weight on the scale.

General use of this plate will allow of no misunderstanding of the load rating of the classis, an all the standard weights (which will be the same for all standard chassis of the same mode) will be stamped on the plate before the chassis is of ferred for sale, and it will be apparent from the figures that the body weight allowance has been deduced from the torn the contract of th

This plate meets the requirement pointed out by Mr. Machol when he writes: "The chassis should be labeled with the actual load that it is built and designed for, and the weight of the bedy should be subtracted from this capacity when the actual load entire the weight of the bedy should be subtracted from this capacity when the actual load entrying capacity is fluitted."

load that it is built and designed for, and the weight of the body should be subtracted from this capacity when the actual when the subtracted from this capacity when the weight of the subtraction of the

In personal correspondence on this subject with the gudersigned, Mr. Machoi writer: "We believe what should be done is to rate the chassis according to its gross load capacity and make the purchaser realize that the weight of his body is a considerable feature or factor"—precisely what is contemplated by the cuttout plate. Very truly yours.

Secretary Commercial Vehicle Committee.
7 East 42nd street, New York City, Aug. 8.

FEDERAL TRUCK CLIMBS MOUNTAIN.

First Commercial Vehicle to Negotiate Mount Wilson Grade on Pacific Coast.

The record of being the first commercial vehicle to climb Mount Wilson in California, is held by a Federal, made by the Federal Motor Truck Company, Detroit. E. Roger Stearns, vice president of the Standard Motor Car Company, Los Angeles, Pacific Coast distributor for this make of ear, recently drove a one-ton machine over the old toll road, usually utilized only by burro caravans, the distance being 14 miles and the altitude 5700 feet. It took less than three hours to make the ascent, and the descent was made in 145-00.

This company is having decided success with the Federal in this territory, judging from the fact that it has sold 85 cars in and around San Francisco and Los Angeles during the past year. Last month it ordered 28 more machines.

LOS ANGELES SELECTS AUTOCAR.

Decides Upon This Make for Municipal Service After Testing Numerous Machines.

After tests of a number of makes of machines, Los Angeles, Cal., recently placed an order for several oneton Autocar trucks, made by the Autocar Company, Ardmore, Penn., for use in several municipal departments. The tests to which the vehicles were put were unique. Each agent competing for the order supplied a truck at the city garage. Each truck was driven by a representative of the agency, accompanied by a mechanic employed by the city. The instructions were that the mechanic and driver were not to talk to each other, the driver was not made aware of the destination, neither did he know what, in the eyes of the mechanic with him, would constitute a demerit, and not until the return to the starting point was the result announced. The journey consisted of a round trip through a certain park system, then up some of the steepest hills to be found in the vicinity of the city and out through a sandy stretch almost impassable, and then back to the city.

B. O. E. MAKES REMARKABLE RECORD.

Hauls Big Consignment of Sugar from Philadelphia to Harrisburg Without Difficulty.

A 3.5-ton B. O. E. truck recently completed a run from the Franklin Sugar Refining Company's plant in Philadelphia, Penn., to Harrisburg, the same state, covering a distance of 397 miles in 10 days, and delivering to the Whitman, Schwartz Company a 45,000-pound consignment of sugar. In addition a horse wagon, loaded with 15 barrels of sugar, each weighing 365 pounds, was used as a trailer. The vehicle withstood the trip without a defect in any way, but the

wheels of the trailer had almost collapsed from the heavy load. The truck was equipped with Diamond tires, Bosch magneto, T-A-D spark plugs, Diamond drive chains, Hele-Shaw clutch, Cotta transmission and chome nikel steel jackshafts, made by the Carpenter Steel Company, Reading, Penn., Holley carburetor and Blood Bros, universal joints, Keystone grease and Vacuum Mobiloid were used.

SHOULD CARE FOR TRUCKS.

General Motors Official Holds That Driver Should Inspect His Car Each Day.

Vice President Gleason Murphy of the General Motors Truck Company is very emphatic in his views regarding the care of commercial vehicles. He says they should be given attention at all times, and advocates that an owner should get his driver into the habit of making a thorough inspection of his machine at the end of each day's work. Speaking of the contention that the life of a truck is limited, Mr. Murphy 835×1.

"I know a truck that has been in use over six years and is doing good service today. Proper care has brought about this long record. This also embodies the statement that a truck's period of usefulness is limited. It all depends on the care given and if owners would realize the importance of this point they would find that motor trucks would not depreciate so rapidly, and would give a surprise in the daily work."

Swift & Co., the well known meat packing house, has adopted the mechanical transport in several cities in which it operates distributing branches. In order to secure the atmost efficiency from its equipment, this concern takes particular pains to instruct its drivers in the use of the motor vehicles. A eard, bearing several "Do's and Don'ts" for drivers, as well as the local and state regulations respecting the use and speed of such vehicles, is presented to each man, this bearing the signature of the superintendent, and each driver is held personally responsible for the care and maintenance of his car. The object is to reduce the possibility of accidents to a minimum, and the plan has been found to work out most admirably.

R. C. Kimball, formerly a division engineer with the Detroit River Tunnel Company, in charge of constructing the Wimlsor, Ont, end of the Detroit river tunnel, and for several years engineer with the Pere Marquette, Detroit, has been appointed district manager of the Cleveland-Galion Motor Truck Company, with headquarters in Detroit. Mr. Kimball is at present engaged in working out the problem of reducing the cost and time of handling freight in factories, railway terminals and warehouses by the use of the dynamic warehouse truck.

TRUCKS IN CONNECTICUT ARMY MANOEUVRES.

Successful Demonstration of Practical Utility, Despite Conditions Which Prevent Cars from Showing to Best Advantage—Some General Results Obtained.

WITLE the use of motor trucks instead of mule wagons in army work was given its most extensive trial, insofar as the American government is concerned, in connection with the recent manoeuvres in Connecticut, it will be some time before the general public is acquainted with the results obtained. Some facts seem to stand out pre-eminently in a general consideration of the problem, but even these cannot be regarded as finally established, largely because most of the vehicles employed were secured at the last moment and were in no sense constructed for army work.

This last feature is of decided importance, when it is remembered that army wagons are expected to traverse ways that by no stretch of imagination can be declared roads in the accepted use of that term. Mule

called upon to haul loads through underbrush. even, and a c r u s s open fields. It goes without saying that trucks which are imended for use over city and subnrban wavs. as were most. if not all those e m p loved in the recent m a n oenvres. cannot hope to meet all requirements of such service.

teams are

Source "Ploneer Freighter" Londed with Camp Equipment and Ready to Take the Field-

It would appear some of the commanding officers were not aware of this phase of the situation, and in a few instances the vehicles were assigned work which was beyond what could be reasonably expected of them.

However, sufficient was learned to indicate that no future manoeuvres will be held without the presence of motor trucks, and in ever increasing numbers. And it may be well to add that those in charge of such trials will work in conjunction with manufacturers in an effort to solve the army transportation problem. That the trucks showed up so well, under the circumstances, is sufficient indication that vehicles constructed with some idea of what is expected of them will put a very different light upon the matter of army haulage.

Both armies were plentifully supplied with trucks,

among the makes represented being the following: White, Pierce-Arrow, Saurer, G. M. C., Packard, Alco, Sternberg, Decatur, Kelly, Gramm and Federal. Several pleasure cars also were used by the officers for quick communication between various sections of the field, these including: Pierce-Arrow, Cadillac, Franklin, Hudson, Stevens-Duryea, Matheson, Lozier, Mitchell, Thomas, White and Panhard. The carrying capacity of the trucks varied from 1500 pounds to five tons, with the average between two and three tons.

Mule wagons have a capacity of 3000 pounds. Usually this is hauled by four mules, but when it becomes necessary to leave the main road and take to the cross country roates, this number is increased to six or eight. When the road conditions are what might be

> revarded as ideal the nule team will average about 2.5 miles an hoste. Wheat the mule can no longer haut the wagon. because of the condition of the ground over which it is desired to transport the load, it becomes a pack animal, capable of carrying some 300 pounds.

With the trucks, it was found

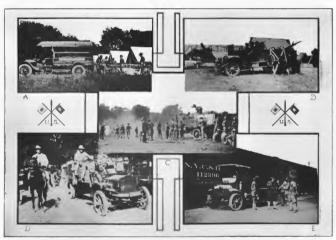
that most of them could stand a substantial overload. This applied particularly over good Perhaps it might be said that one of ways. the results of the trials was the demonstration that motor vehicles were able to supplant the railroad in reaching the field of activity somewhat distant from the main base of supplies, so that a much smaller detachment of men was necessary to guard the main depot. To summarize this situation, it may be stated that trucks of from three to five tons capacity were found most desirable for transporting supplies, etc., from the main depot to the minor distributing points. from which they could be delivered in the field most advantageously with vehicles of less capacity.

One of the trucks, assigned to one of the New York

regiments, was sent over the road from Stratford, Conn., to New York City and return, a distance of 120 miles, in 12 hours, this time including 4.5 hours spent in loading. The roads over this stretch were considered as particularly good, although they were worn in one or two places. The average speed of 18 miles an hour may be compared with the 25 made by mule wagons, but it cannot be regarded as absolutely conclusive, inasmuch as a large proportion of the hauling was accomplished over roads which would in no way compare with those of the shore line into New York. In many cases the hills were so steep that the mules were unable to negotiate the grade, particularly in the excessive heat. And this presents another view of the

impossible to make such detours, in which case it would be necessary to have trucks designed for this particular purpose.

It was demonstrated that the smaller trucks were able to make two or three trips, one after the other, without difficulty. This is nothing new, when it is remembered that fire apparatus, for instance, frequenty is called upon to answer a second alarm soon after returning from the first. This feature of the motor truck has been demonstrated time and again in every day work. In the manocurves it was found that trucks operating between the main supply and secondary base were capable of averaging 48 miles a day, while those utilized for hauling between the secondary while those utilized for hauling between the secondary



White Trucks in Connecticut Manoravrest, A, Ambalance in Service with the Field Hospital; B, 1-5-Ton Wogon Employed in Hanilag, Aeroplanest C, Islonding Supplies for the Blue Army; D, Tree-Ton Truck virthing with Equipment from Brooktyn, A, Y, C, E Pive-Ton Vehicle at the Commissory Stores at Orange, come, Londing Hey and Olar.

simation, since it is by no means advisable to wait until the cooler hours of the day before transporting smodies when the army is in action.

Trucks of 1.5 and two tons capacity were geared to advantage in delivering supplies from the secondary base to the field of action. As has been stated, conditions often were found where it was impractical to send the trucks through country which could be traversed by the mules, but in most instances it was possible to send the motor vehicles around another way with even better results, because of their ability to travel faster. Of course, stuations might arise wherein it would be

base and the fighting line averaged 42 miles a day.

Some special work was undertaken. For the first time in the history of the American army provision had to be made for transporting aeroplanes and aeroplane supplies. Naturally, power wagons were utilized for this purpose. For some reason, possibly because the aviators had had insufficient time in which to become accustomed to their machines, this branch of the service did not show up as satisfactorily as might be wished. This has reference to the aeroplanes; the work accomplished by the motor trucks in this line was above represach.

There was not the same question concerning the

vehicles utilized for hospital service, this being due to the fact that cars were employed for this purpose last year in practically every militia encampment throughout the country. They may be regarded as having thoroughly demonstrated their worth. This is wholly in line with what has been accomplished abroad.

Although no bullets were flying about to bring injuries to the contending armies. He hospital corps was kept active treating cases of heat prostration and ordinary allments to which flesh is heir. Each army mustered about 10,000 men, and it may well be assumed that there was plenty for the motor ambulances to do. Two White 1500-pound wagons were utilized as ambulances, and they often were forced to make their way over bad roads and across farms to reach the side of the soldier who had fallen from sheer exhaustion while manoeuvring with his company. They made at least 20 such trips a day, not mentioning those to the nearest railroad stations for forwarding patients to their homes.

It is probable that the product of the White Com-



Five-Ton Pierce-Arrow Truck En Route from Buffato, N. V., for the Connecticut
Manocuves.

pany. Cleveland, O., leads all others in number of vehicles in service. These included two of five tons, two of three tons, three L-ston wagons and the two 1500pound ambulances. Officers in charge of these cars stated that by combining the heavy equipment of the three-ton trucks with a few of the lighter 1.5-ton wagons as auxiliaries, every objection raised thus far could be met easily. On the other hand, they were willing to concede that the trucks had some very conspictuous daynatages.

For example: Some of the batteries had an equipment of 40 to 50 teams of mules instead of motor trucks, whereas others had their entire equipment of the latter. In other words, the wagon train of the former was about three times the length of the batteries which used motors, which meant just so much more extended line to defend, a very important item. Horses or mules must be supplied with forage at every camp site, while power wagons carry sufficient gasoline to cover a week or 10 days' march—another very great advantage should the army be travelling in a hostile

Probably the truck which covered the longest distance was a five-ton, worm driven Pierce-Arrow, made by the Pierce-Arrow Motor Car Company, Buffalo, X. Y. This was loaded with the property of the Fourth Brigade, New York National Guard, with headquarters in Buffalo, and sent overland to the scene of the manoeuvres, after much the same plan as that employed by the German army.

It is stated that this truck carried a load weighing some 10.750 pounds, which made the total weight of the vehicle and load about 10 tons. On the way from Buffalo to New Haven an average daily mileage of 150 miles was maintained. Because of the unusual weight of the truck and load, several long planks were carried, these being utilized to reinforce the bridges or route.

Five Alco trucks, made by the American Locomotive Company, Providence, R. I., were furnished the

> quarternaster's department by the Smeilley Company, general transfer agent, in New Haven. These made three and four round trips a day over deeply rutted roads and through fields that had been softened by freouent showers.

These may be considered as sample statements of what was accomplished by the various vehicles. Mention already has been made of the Saurer, produced by the International Motor Company, New York City, and in this connection it is of interest to examine the report of a Mack truck, also made by this concern, in the manoenvres

in Wisconsin in June. This is set forth in the following table:

June	Daily Report of	of Mack Truck. Clais, Gas	Qts. Of
20	18	1.5	2.4
21	30	2.5	3.3
22	28	5.5	2.0
23		4.0	2.4
24		6.0	2.5
25	26	5.5	3.5
26	10	5.0	1.5
27		7.0	1.1
28	28	7.0	0.6
29	28	5.0	0.0

It should be stated that this is only a partial report of the work done by this truck, and covers only that portion of the tour of duty spent in camp at Middletown, Wis, and much of the travel was between the camp at Madison. All told the Mack was in service June 7-30, and covered a total of 6754.3 milles. A Sauer in the same service covered 7031.7 miles.

The recent manoeuvres in Connecticnt will be made the subject of an extensive report to the governmental departments and will be awaited with interest.

New 6mmercial &rAccessories.

Nelson Compression Coupling.

The A. Nelson Manufacturing Company, Randolph and Jefferson streets, Chicago, is marketing a coupling for connecting tubing on gasoline or oiling systems without swaging or the use of solder. The device is made tight by means of couplings threaded over another member, the operation compressing and making the joints leak proof. The couplings are made in different sizes.

Starrett Ratchet Wrench.

The Starrett ratchet wrench outfit is produced by the L. S. Starrett Company, Altol, Mass, and comes in a neat box. The kit comprises a ratchet wrench with reversible pawl and an extension; a spark plug socket, universal joint, drilling attachment, etc. The equipment also includes 28 hexagonal steel sockets, varying in size by thirty-seconds from 3125 to 125 inches. The parts are nicely finished and of high grade material.

Northwestern Hydrometer and Thermometer.

Among the instruments useful about the garage is a gasoline hydrometer for testing the specific gravity of the fuel. The Northwestern Chemical Company, Marietta, O., is manufacturing a combined gasoline hydrometer and thermometer which is moderately priced and which comes in a glass testing jar and nickel carrying case. The device is equipped with a thermometer correction scale for variations in temperature.

Superior Double Spark Plug.

The Superior Motor Specialty Company, 44 North Fourth street, Philadelphia, is manufacturing the Superior double spark plug, which is provided with dual electrodes and a like number of terminals. By its use two sparks may be produced simultaneously in the cylinder of a motor, a method making for greater efficiency as well as economy of fuel as the vapor is more completely burned. The plug may be utilized for independent circuits if desired and is constructed of high grade material. The maker claims that the points are self-eleaning and that the plug may be employed as a single member.

Owen Valve Grinder.

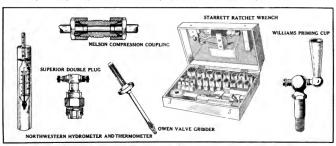
The Owen valve grinder, marketed by the Stewart Grinder Company, 171 Breadway, New York City, is designed to take the place of the screw driver, or brace and bit. The weight of the tool is such that no downward pressure is necessary in grinding a valve, the tool simply being rotated in the usual manner. The handle is corrugated and the device is nicely finished. The company also manufactures Gryndyn, a valve grinding compound which comes in screw top boxes and which is inexpensive.

Williams Priming Cup.

The Williams priming cup, marketed by the D. T. Williams V alve Manufacturing Company, Cincinnati, O., presents novel features, inasunch as its lever is funuel shaped and when placed in the proper position its opening registers with that of the cup, permitting the flow of fluid to the cylinder. The cup is equipped with a spring key which automatically adjusts itself to wear. Another feature of the device is that when the handle is down or closed the entrance of foreign elements is prevented.

Decarbonizer.

The Milwaukee Auto Specialty Company, 128 Second street, Milwaukee, Wis, is marketing Decarbonizer which chemically removes carbon from cylinders, pistons, rings, etc., as the liquid volatilizes it.



Some Accessories Applicable to the Commercial Vehicle, including Novel Priming Cup, Houble Spark Ping, Valve Grinding Tool and Compression Coupling.



Manicipal Service Equipment



FIRE CHIEF'S CONVENTION.

Important Matters to Be Discussed at Gathering in Denver This Month.

The annual convention of the International Association of Fire Engineers, to be held at Denver, Col. Sept. 17-20, will be one of the most important gatherings of fire department officials that has taken place in recent years. Conditions have changed radically during the past few years, due primarily to the introduction of motor driven apparatus, which has placed the varions fire fighting systems upon an entirely new basis.

Fire chicfs are studying closely the effect of these vehicles upon better fire protection and the coming convention will devote a large share of its time to mo-



Knox Combination Chemical and Hose Wagon Installed in Station at South Attleboro, Mass.

tor trucks, hose wagons and engines. The subject promises to provoke much comment and the discussions will furnish many valuable hints as to the efficiency and shortcomings, if any, of motor fire apparatus, gained by the chiefs of many cities by observation of their practical application to the work for which they were designed. Manufacturers of automobile fire machinery are keenly interested in the convention and will follow closely, with the idea of profiting by, the conclusions drawn by the fire chiefs and insurance underwriters, who will also touch upon the topic.

The programme contains the following papers, which will be open for discussion: "Fire Prevention and Building Inspection by Members of Fire Departments," by Fred Brodbeck, chief, Salina, Kan., and A. Schwen, manager S. E. Underwriters' association.

Atlanta, Ga.; "The Triple Combination Hose Wagon, Chemical and Pumping Engine, Is It a Success?" by F. J. Connery, chief, New Castle, Penn.; "The Proper Location of Sprinkler Tanks. Should They Be Located on Roofs, Fire Walls or Separate Towers?" by L. A. Tremblay, chief, Montreal, Can.; "Tractors for Steam Fire Engines, Aerial Trucks and Water Towers," by John Kenlon, chief, New York City, and R. H. Bowker, chief, Passaic, N. I.; "The Care of Fire Hydrants to Prevent Freezing and the Best Way to Thaw Out Frozen Fire Hydrants," by C. W. Ringer, chief, Minneapolis, and John Aiken, chief, London, Ont.; "Direct Connection from City Water Mains to Sprinkler Systems and Standpipes," by F. A. Raymond, engincer, National Board of Fire Underwriters, New York City; "Motor vs. Horse Drawn Apparatus in Heavy Snows," by James Smart, chief, Calgary, Can.: "The Efficiency of the Motor Pumping Engine," by George W. Booth, chief engineer, National Board of Fire Underwriters, New York City; "A Review of the Association Work for the Past Ten Years," by Howard L. Stanton, chief, Norwich, Conn.

KNOX FOR COUNTRY DISTRICT

Combination Vehicle Recently Placed in Service in South Attleboro, Mass.

An accompanying illustration shows the Knox combination chemical and hose wagon, recently acquired by the department in Attleboro, Mass, for the station in South Attleboro. This district is about 4.5 miles from the centre of the town, and the volunteer company is called upon to cover a wide radius, largely composed of country and suburban residences. But two permanent men are employed, and one of these will operate the new car.

The machine is made by the Knox Automobile Company, Springfield, Mass., and is a stock model in every respect, equipped with a 48 horsepower motor. Perkins self-lighting system, 30-gallon chemical tank. 200 feet of chemical hose, 1200 feet of regulation fire hose, two 18-host extension ladders, axes, pike poles, lanterns, etc. In practically every respect it is a duplicate of the combination wagon which has given exceptional service in the central station at Attleboro during the past year.

WHITE PROTECTIVE WAGON.

Boston's Experience Indicates That Service Is Much Superior to Horses.

The city of Boston maintains what is known as a protective department, which is in reality a part of the fire department and is so recognized insofar as legal provisions are concerned, although the various insurance concerns are assessed in proportion to the amount of premium returned. This force is supplied with suitable apparatus for saving life and property at or after a fire.

The White car, made by the White Company, Cleveland, O., and shown in an accompanying illustration, has been in this service for some time past, taking the place of horse drawn equipment. It carries extension ladders and tarpaulin covers, the latter being utilized to protect merchandise from water. Inasmuch as the section served by the car is extensive it has developed that not only can the machine carry a much larger load, but can be depended upon to arrive at the scene of the fire in quicker time, thereby indicating an efficiency over horses, which cannot be reduced to dollars and cents.

EXPERIENCE OF PASSAIC.

Saving in Maintenance Cost Sufficient to Purchase New Machine Each Year.

Chief R. H. Bowker of the fire department in Passaic, N. J., in reply to a letter from Chief Charles N. Hogg of Binghamton, N. V., states that the city now has H pieces of motor apparatus, two of which are tractors. Last winter was most severe, the borses experiencing difficulty in travelling through the heavy snow, although the automobiles were able to answer all slarms.

At the beginning of the year, Passaic had 27 horses in this service, which cost \$4800 for feed and shoeing. Today there is not a single horse in the department, and the cost of maintaining the motor equipment does not exceed \$1200 a year. Chief Bowker asserts that the saving effected between horses and motors is sufficient to enable the purchase of one piece of automobile apparatus each year.

BOND ISSUE ASSURED.

Pittsburg Plans to Expend \$700,000 for Fire Apparatus and Police Patrols.

At the coming election in November the voters of Pittsburg, Penn, will be asked to authorize the sale of \$5,000,000 in bonds for various improvements, \$700,-000 of which is to be expended in the purchase of automobile fire apparatus and police partols. Practically no opposition is manifested toward the proposition, and the bond issue seems assured. Public Safety Director John M, Morin has suggested a contingent fund of \$20,000 for motor driven police wagons, and there are now being delivered seven of these vehicles. An effort will be made to increase this number to 12 before winter. This will carry out the plan of putting the entire police patrol system of the city on a hors-dess basis.

FIGURES INDICATE ECONOMY.

Two Cities in New York State Find Motors Reduce Maintenance Cost Appreciably.

Chief Mulcaly of the fire department in Vonkers, N. N. states that during five months the cost of maintenance on one of its motor vehicles was \$453.90, accompared with \$410.28 for horse drawn equipment of a similar nature. The automobile responded to 122 alarus, travelling 234 miles, while the horses answered 80 alarms and covered less than 90 miles.

Chief E. J. Shadwick of the department in Saratoga, N. Y., also presents interesting figures. For 12 months his motor vehicle cost \$28.76 to maintain, whereas the



While Truck Fitted as Protective Wagon and in Service with Boston Department.

horse drawn apparatus in the same house cost \$500.22 for the same period. In the latter instance the salary of another man, \$780, must be added. A new team was purchased at a cost of \$200, which brings the total maintenance charge for the horses to \$1570.22.

WEBB COMPANY REORGANIZED.

Factory to Be Removed to Allentown, Penn., and Line Will Be Increased.

John M. Mack, Allentown, Penn., it is reported, has scured control of the Webb Motor Fire Apparatus Company of St. Louis, Mo., which will in future be known as the Webb Company, with sales office in New York City, where Milton B. Strauss will be located as sales manager in the United States Rubber building, Broadway and 58th street. The Webb plan will be removed from St. Louis to Allentown, where the \$25,0000 plant of the Allentown Machine & Foundry Company has been secured. Some changes, it is



There Cole Rondsters Employed by the District Chiefs in the Fire Department at Minacapolis. Mina-

stated, will be made in the Webb line,

The Webb Company has been completely reorganized with the advent of Mr. Mack. He was one of the founders of Mack Bros. Motor Car Company. maker of the Mack line of trucks, now included in the product of the International Motor Company, which also has the Hewitt and Saurer lines. He recently resigned as vice president of the latter company to form a \$600,000 corporation to take over the Webb interests. The office of the concern will be at Allentown, Penn., while a branch factory will be maintained at St. Louis. Distributing branches will be operated at New York, Boston, Philadelphia, Atlanta, Ga., Cleveland, O., Chicago, St. Louis, Kansas City, Dallas, Tex., Vanconver, B. C., Halifax, N. S., Portsmonth, O., Los Angeles, Cal., San Francisco, Cal., Winnipeg, Can., Spokane, Wash,

BRIEF ITEMS OF INTEREST

Manufacturers Should Be Assisted—Chiei John Kenlon of the New York City fire department, who has made a thorough study of modern fire fighting apparatus, makes an excellent plea for the manufacturer of gasoline pumping engines. He delares that it is the duty of all fire department officials to assist in developing this phase of the situation, by placing the product in service, so that eventually the perfect type of engine will be evolved, just as the steam fire engine was perfected through actual use in fire fighting.

Cartercars in Milwaukee—As is more or less well known fire department officials in several cities throughout the country have been utilizing friction driven Cartercars, made by the Cartercar Company, Pontiae, Micha, with splendid success. An accompanying illustration presents the seven new machines of this make recently installed in the department at Milwaukee, Wis. The picture was taken in front of the department headquarters and Milwaukee's famous jail is shown at the left.

Cole Roadsters for Fire Service—Three of the frechiefs in Minneapolis, Minn. recently took possession of 1912 Cole roadsters, made by the Cole Motor Car Company, Indianapolis, Ind., and shown in an accompanying illustration. The sale was made through the agency of Harvey Haynes of the Haynes Knutson Auto Company, Minneapolis, northwestern distributor for Cole cars. Mr. Haynes is shown at the extreme right of the picture. In the cars, from left to right are: District Chief Edwin Theilen, Assistant Chief E. E. Caldwell and District Chief John Anderson. The Minneapolis department now has 12 pieces of motor apparatus.

Bulletin for City Officials—The American-La-France Fire Engine Company, Elmira, N. Y., which is actively engaged in the manufacture of several types of mott of driven fire unachines, has inaugurated a series of monthly bulletin is in which valuable hints are given



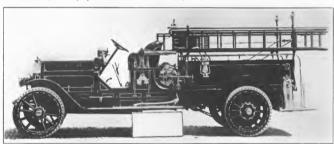
Seven Carterears Recently Placed in Service with the Fire Department at Milwaukee, Wis, in Front of the Hendquarters.

comment.

KisselKar Proves Satisfactory Salina, Kan, is said to be the only city in the country anywhere near its size which can boast of a complete equipment of motor vehicles in its fire department. The last horse in the Salina service was sold last mouth, when the KisselKar shown herein was officially accepted. That the product of the Kissel Motor Car Company, Hartford, Wis,, is proving efficient in this class of service, is borne out by the fact that wherever it has been given a trial it has demonstrated satisfactory speed. On the first run at Salina the truck covered a little over a mile in 2 01.

Pittsfield Orders Aerial Truck- The fire department committee of Pittsfield, Mass., has given an order for a new motor aerial truck to the American La France Fire Engine Company, Elmira, N. Y. The ma-

to city officials contemplating the purchase of such of motor combination hose and chemical car; Portland. Ore,, investigating motor apparatus in other cities with view to purchase; l'ittsfield, Mass, insurance engineers recommend purchase of motor car for chief and a motor combination hose and chemical car for general service; St. Joseph, Mo.; Dubuque, Ia., committee to investigate motor fire apparatus is being formed; Champaign, Ill.: Alameda, Cal.: Chelsea, Mass., money has been voted for purchase of combination chemical and hose car; New Orleans, La.; Clarksdale, Miss., inspecting apparatus with view to purchase of combination chemical and hose car; Glendale, Cal., seeking bond issue to build fire station and equip it with motor fire fighting machines; Dallas, Tex., building \$15,000 fire station, to be equipped with automobile fire fighting apparatus; Jersey City, N. J., an appropriation of \$41,300 is to be asked for the purchase of four combination wagons, one 75-foot motor aerial truck, two motor triple combination cars, one car for the telegraph department and one chassis for No. 19 engine;



KinselKar Combination Wagon Which Recently Replaced the Lant Horse Drawn Equipment in Sallan, Kan-

chine will cost \$11,000 and is to be delivered on or before Nov. 15.

Motor Police Patrol at Binghamton-A new motor driven police patrol wagon, made by the Packard Mostor Car Company, Detroit, has been accepted by Burghamton, N. Y., the officials of which city are pleased with the efficiency of the wagon as shown in the tests.

Waterloo Likes Seagrave Cars-The Waterloo, Ia., fire department has placed an order for another Seagrave motor combination chemical and hose car, made by the Seagrave Company, Columbus, O.

In the Market-Following are some of the cities which have under consideration the ourchase of motor driven fire apparatus: Cleveland, O., appropriation of \$4600 for purchase of auto patrol wagon; Monroe, Wis.; Sacramento, Cal.; Wallingford, Conn.; Racine, Wis, (Spencer, Mass., to ask appropriation for purchase

Lynn, Mass., bonds of \$28,000 have been issued for purchase of motor equipment; Bakersfield, Cal., an issue of \$60,000 in bonds for motor equipment of fire department; Wundber, Penn.; Fresno, Cal.; Wilmington, Del.: Grinnell, Ia.: East Livernool, O.

Springfield Adds Lifesaving Car-A lifesaving car. similar to the Knox car previously installed, has been added to the automobile fire equipment in Springfield, Mass. The new machine is built on a 50 horsepower Knox chassis and is distinguished by a strong curved bumper extending across the front of the car and affording protection to the radiator, engine, headlights and front wheels in case of collision. In addition to all manner of lifesaving apparatus, provision is made for a good sized squad of men-

Motor Ambulances-The city conneil of Des Moines, la., has authorized the purchase of a motor combination ambulance and natrol wagon.



AINTS·FOR·PROPER MAINTENANCE

A Department for the Owner, Driver and Repairman.



BYPASS DEVICE FOR CARRIERTORS

With some types of carburetors it is a difficult matter to secure a satisfactory adjustment at both high and low speeds; that is, the vaporizer may be so set that the moter will throttle down nicely at low speed, but when the lever is moved wide open or nearly so, the mixture will be such that the efficiency of the power plant is greatly reduced.

While the carburetor on the commercial vehicle is not subjected to the variable demands noticeable with the pleasure automobile, a flexible motor is desired. This requires a carburetor which will permit the en-

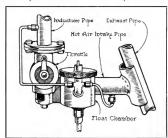


Fig. 1—Bypass Device for Attachment, to Float Chamber of Carburetor, Designed for Easy Starting of Motor, Etc.

gine to be throttled down very slowly as many drivers make it a practise to run the motor when it should be stopped. Another important factor is easy starting.

An English engineer placed upon the market recently a new form of bypass attachment to the carburetor and it is claimed that it improves the slow running qualities of a motor as well as provides a proper mixture when the throttle is closed. In addition, it is stated that the flexibility of the motor is increased by its use.

The bypass is depicted at Fig. 1 and it will be noted that it takes the form of a small jet chamber, screwed into the float chamber of the carburetor, whence it takes its supply of fuel. Over the gasoline jet of the bypass is an adjustable set screw provided with a lock nut. By means of this screw the mixture can be changed until the desired result is obtained. The air passing over this jet is taken from the main hot air intake pipe of the carburctor through a small hore copper pipe connected by suitable unions. A similar pipe leads from the bypass to the induction pipe at a point above the throttle equi-distant from all cylinders. Thus when the throttle is closed the vacuum in the induction pipe causes a rich mixture to pass to the motor from the bypass, this amount being such as to permit the engine to turn over slowly.

Similarly when the throttle is in any other position than fully open the partial vacuum in the induction pipe draws a small quantity of gas from the supplementary supply, this tending, it is claimed, to keep the strength of the mixture constant and correct at a time when it naturally tends towards weakness. It is also pointed out that starting is made easy because of the adjustable features of the bypass device.

INCREASING SIZE OF REAMER.

To increase a worn reamer's size, polish the face of each tooth with a hardened burnisher, which can be made from a three-cornered file rounded off on the corners. This will increase the size from two to 10 thousandths. The reamer is then honed back to the required size. To make a tap or reamer cut larger than itself, place waste in a flute, just enough to crowd it over so it will cut on one side only. In sizes of 1.5 inches or larger, put a strip of tin on one side and let it follow the tap through.

REPLACING WORN SPRING BOXES.

The spring boxes on the rear axles of some types of ears wear so badly during the season that they become loose on the tube, rattle and jump on rough roads. This is especially true where the members are of one piece, and to obviate this trouble a number of machines are being equipped with divided boxes, so that they may be adjusted for wear.

A repair may be effected in the following manner: Remove the worn members from the aske by cutting them in pieces with a hacksaw. Next true up and smooth the asle with a file. Patterns are then made for a new set twice the width of the original, and in two sections. Malleable iron castings are made from these, after which the flat surfaces are planed, four

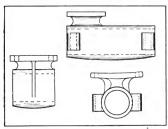


Fig. 2—Method of Replacing Wora Spring Boxes on Rear Axies by Making Patterns for Malicable Iron Castlags.

holes drilled for the clamping bolts and the two halves bolted together as shown at Fig. 2. The box is then chucked in the lathe and the hole bored to fit the axle.

UTILIZING GIRDERS FOR SHELF.

It is surprising how much old material collects in the garage and repair shop and when the building is of concrete or cement, it is more or less difficult to arrange shelves for the storage of old lamps, seats, etc. At Fig. 3 is presented a method utilized by the proprietor of a repair shop for fitting shelves to the iron girders. A piece of flat iron of suitable thickness was bent in hook form to clasp the projection of the beam, and the lower end of the metal bent at right angles for the purpose of securing the boards, as depicted in the drawing.

Another piece of iron was forged to the shape of the projection of the girder and was drilled to take a both which was also passed through the main member and locked with a nut. Four langers were employed and to these were secured the shelves. As there was much space between the beams, the shelf provided means for storing ounsiderable old material.

PLANETARY TRANSMISSION TIPS.

The planetary transmission is simple and easy to operate, but requires care. While this type seldom gives trouble other than readjusting or relining the bands, the high speed plate will slip at times and when this occurs the member must be taken up.

In adjusting the part the best nut is loosened and the collar turned clockwise. Before looking the part, the hand or operating lever should be worked to see if the speed locks easily. If after this the clutch still slips, and further adjustments do not bring about the desired results, and considerable strength is required to lock the lever in pestion, it is well to examine the

high speed plate and note if it be not cracked. Sometimes these members will split, especially if subjected to considerable play in the end thrust bearings, and when locked the plate will spread, failing to grip properly. It is difficult to repair these members and the casiest and cheapest way is to purchase a new one. Before fitting the new part look for end play of the driving shaft and if any exist, readjust bearings, as the new plate will be likely to break as did the old part.

If upon setting the high or low speeds, they hold properly when being utilized, they should be tested to note if they are dragging. This may be accomplished with the motor idle, clutch out and the brakes released. If upon crashing the motor the machine has a tendency to roll forward, the bands should be examined to see if they are gripping too harshly. It may be that the lining has become worn and that the material does not make a good contact except in one or two places of the circle.

When these conditions exist the friction set up will heat the casing unduly and if the transmission be worn, the lubricant will melt and run out. Sometimes the springs holding the bands open when not in use, lose their elasticity. The latter should not press against the metal and if adjusted properly will contact sufficiently to perform their work and at the same time will not produce undue friction.

CARVER PORTABLE DRILL

There are many places about the chassis of the motor car which must be drilled to fit special appliances and it is not always convenient to remove the part and carry it to the bench. Sometimes it is difficult to operate a hand or breast drill, owing to lack of room in which to rotate the handle. The portable electric drill overcomes these difficulties and in addition much valuable time is saved to the customer as well as the shop.

The American Electric Tool Company, West New-

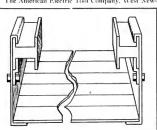


Fig. 3-Suggestion of Hillsing Girders for Shelves by Fitting Hangers to Which Boards Are Fastened.

ton, Mass., is manufacturing what is known as the type 3-A. C. Carver portable electric drill, presented at Fig. 4. It is a two-speed instrument, providing 350 or 650



Fig. 4—The Carver Portable Electric Brill Having Two Speeds, Combination Regard Plate and Samle Bandle.

revolutions a minute as desired and is capable of drilling steel up to and including 5 inch. It is very compact and weights but 23 pounds and comes equipped with 20 feet of best flexible water proof cable, 16 gauge, and separable socket attachment plug for connecting to any lamp socket.

The motor is especially designed to produce maximum power with least weight, and the armature rotates in imported ball bearings. The gears are of high grade steel and Parsons bronze, and by means of a thumb unt on the front head the speed can be changed while running. A ball thrust bearing protected by a dust cap, reduces wear and friction to a minimum. The motor is air-tooled by forced circulation and the air apertures are covered with perforated metal to prevent the entrance of metal chips. The spindle bearings are of the best hard bronze, and it is pointed out by the maker that the drill requires no other attention than oiling.

Each member is equipped with a combination breast plate and spade handle, permitting of use in any desired position, and a No. 1 Morse taper socket instead of clutck is optional. Instant control is obtained by a quick break switch in one of the side handles. The other member unserews. The clutck is off centre, allowing the drill to be utilized in a corner.

VICTOR PORTABLE TIRE INFLATOR.

In order to render quick and efficient service to its patrons the garage should be equipped with means other than the manually operated pump for inflating tires. While tanks of compressed air are largely utilized, this system has the disadvantage of not being portable; that is, the automobile must be moved in proximity to the hose.

The Victor Electric Company, Chicago, has brought out a portable tire inflator which is a combination air compressor, electric motor and pressure gauge as a unit, and among the commendable features is that the device may be utilized for removing the dust

which lodges in the crexices of tufted cushions and other places difficult of access by other means. Being mounted on wheels it is moved easily about the garage and may be employed at any point convenient to a lamp socket of the lighting system.

Special attention has been paid to the compressor and its construction embodies high grade material and workmanship. The inlet and outlet valves are of the steel ball type, and are readily adjusted. The cylinder is of steel and its piston is equipped with a patented lubricating device. This consists of a felt ring set into a groove provided near the centre of the piston head and after once being oiled keeps the cylinder well lubricated as well as prevents any surphis oil from collecting and being forced to the inner tube of the tire.

The gauge indicating the pressure is connected to a small reservoir through which all the air must pass on its way to the tire and a drain cock is fitted to this compartment. It has two functions, one making it possible to reduce the tire presssure or to allow all of the air to escape, the other to permit the drawing off of any moisture, foreign elements, etc., that may collect. The deposits are expelled through the drain cock by connecting the outlet hose and pumping up a pressure of approximately 75 pounds before the vent member is opened. As but one-lifth horsepower is required to operate the device, and as it is only in service during the inflating process, the maker points out that it is very economical as well as convenient. Drive from the motor to the inflator is by belt and the reduction is such that a small amount of current is utilized after starting. The pump is actuated by an eccentric.



Fig. 5-The Victor Portable Tire inflator, Actuated by Electric Motor and Making for Convenience.

CORRESPONDENCE.

Pitch of Genra and Measuring Besices.

(11)—Unotice reference made to diametral and circular pitch, also to fine measurements to which gears are subjected. Will you explain the meaning of the pitch terms, also what is a vernier? CONSTANT HEADER.

In the cutting of gears, diameter is always understood to mean the pitch diameter. Diametral pitch is the number of teeth to each inch of the pitch diameter. For example: If a gear has 40 teeth and the pitch diameter is four inches, there are 10 teeth to each inch of the pitch diameter and the diametral pitch is 10, or, in other words, the gear is 10 diametral pitch.

Circular pitch is the distance from the centre of one tooth to the centre of the next, measured along the pitch line. For example: If the distance from the centre of one tooth to the centre of the next, measured along the pitch circle, is S inch, the gear is 5-inch circular pitch.

For facilitating the measurement of wheels to be sized according to diametral pitch, either Brown & Sharpe No. 61 or 78 steel rules are utilized. The former is a 12-inch member containing four lines of graduations upon each side, each one as follows: 18ths, 22nds, 24ths, 26ths, 28ths, 30ths and 32nds. Each line of graduations is figurent the whole length of the rule, 10, 20, 30, etc. If a wheel of 60 teeth of 20 pitch is to be sized, 60 is located on the line of 20ths and that is the pitch diameter of the required wheel. Two of the divisions are added to make the outside diameter which is 62 20ths.

The No. 78 rule is a 12-inch member having one inch only of graduations on each end as follows: 6ths, 7ths, 8ths, 9ths, 10ths, 11ths, 12ths, 14ths, 16ths, 18ths, 20ths, 22nds, 24ths, 20ths, 28ths, 30ths, 32nds, 34ths, 30ths, 38ths. The intermediate 10 inches are blank, except that the inch lines are made clear across the rule.

Suppose a wheel of 83 teeth of 10 pitch is to be sized. Take eight of the blank inches and three of the 10ths graduations, which gives the pitch diameter of the required wheel. Add two of the 10ths, which gives the outside diameter or 8.5 inches.

The vernier is a device for reading finer divisions on a scale than those by which the scale is divided. Sixty-fourths are about the finest divisions that can be read accurately by the naked eye. When fine work is necessary, the vernier is employed.

One division of the vernier is equal to 9 of one division on the true scale, consequently the difference equals. I of the true division or when each of these is one inch, I inch. The difference at the second division is 102, at the third, 03, and so on. If the vernier be moved until the third division coincides, it will have moved 103 inch. It is this principle that is applied to measuring instruments.

When graduated to read in thousandths, the true scale is divided into 50 parts to the inch and the vernier graduated into 20 parts, each division of the vernier being equal to nineteen-twentieths of one on the true

scale. If the vernier be moved so that the lines at the first division coincide, it will have moved onetwentieth of one-fitteth, or .001 inch. A Fig. 6 is depicted the application of the device, showing the method of measuring a sprocket tooth. The insert presents the fine divisions, somewhat enlarged.

(12)—What is tunnelen Steel and Magnets.
(12)—What is tunnelen seel and why do magneto makers
advertise their magnets made of this metal? Is it superfor
to regular steel such as chrome nickel and is it a combination
of alloys or a metal by itself?
Daths, Tex. Aux. 23.

Tungsten as a chemical is a rare element of the chromium group found combined in certain minerals, as wolframite and scheelite, and isolated as a hard, brittle, white or gray metal melting at 2000 degrees centigrade and having a specific gravity of 16.6-19; called also wolfram.

As a metal, steel containing a small amount of tungsten is noted for tenacity and hardness, even under a considerable degree of heat. It often containmanganese. It is utilized for magnets, since it retains

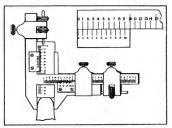


Fig. 6-Fine Measuring Devices: A, Micrometer Tooth Instrument: B, Vernier for Rending Fine Divisions.

its magnetism longer than ordinary steel. By incorporating simultaneously carbon and tungsten in iron, it it is possible to obtain a much harder steel than with carbon alone, without danger of an extraordinary brittleness in the cold metal or an increased difficulty in the working of the heated metal.

SPEEDWELL SHOWS EFFICIENCY.

A Speedwell four-ton truck recently gave a good demonstration of efficiency in San Francisco, Cal. The L. J. Hopkins Company had a very large shipment of fresh fruit to be delivered to one of the Pacific steamers, which had to be loaded onto the steamer saling the day the order was received. The Hopkins company called the Speedwell Motor Car Company's agency 45 minutes before sailing time and stated that it had 13,000 pounds of fruit to be moved at once. A four-ton truck was assigned to the work. Although heavily overloaded the motor vehicle performed the work for which it was called with little difficulty.

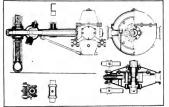
FOREIGN TRUCK NOTES OF INTEREST

BRITISH FRONT DRIVE PILGRIM.

An Entirely New Design Which Is Regarded as Promising for Vehicles of the Light Delivery Type.

Pilgrims' Way Motor Company, Ltd., Faruham, Surrey, England, has produced a light delivery wagon with front drive, which is creating not a little favorable comment throughout the British Isles. The Pilgrim is by no means the first front driven machine brought out abroad, and the designs are considered as having demonstrated their value in numerous installations. There are some features connected with this ear, which are distinctive, and which have caused automobile engineers in Great Britain to suggest that it has decided promise in its particular field.

The motor is a two-cylinder, horizontal opposed unit with bore of 3.85 inches and stroke of four, giving a rating of 11.8 horsepower. This and the gearbox are supported on a tubular steel sub-frame, slung from



Outlining Front Drive Arrangement as Applied to Pilgrim Light Delivery Wagon.

two longitudinal frame members at the rear and attached to the differential easing at the front. Ignition is by Boseh dual high-tension magneto, and the carburetor is of the White & Poppe design. Lubrication is by a combination pump and gravity feed system, whereby the oil is pumped into channels near the top of the crankease, whence it flows downward through various ducts to the crankshaft and bearings and thence to the sump. Cooling is by water, circulation being by centrifugal pump.

The drive is transmitted through a metal-to-metal cone clutch, located in front of the engine, to a threespeed transmission. A short cardan shaft connects the gears to the differential, which gives a gear reduction of seven to one. As shown in an accompanying line drawing, the differential easing is holted between the inbular easings enclosing the front driving axles. The eage for the differential gearing is east in one

piece, and by the removal of the top half and the withdrawal of the castellated axle shafts, the whole of the differential gear may be removed without detaching the axle casing from the chassis.

The drive from the differential to the road wheels is taken through a universal joint of somewhat unusual design, the forks of the driving shafts and driven stub asles being held in engagement with recessed balls. The ball joints of the driving asles are contained in corresponding ball and socket joints on the asle easing, the joints of the latter being brought as closely to the wheels as is possible in order to contribute toward easy steering.

Foot and hand brakes are arranged to operate in the usual manner, the latter acting internally on the rear wheel drums and the former on a drum carried on the cardan shaft between the gearbox and differential. The steering gear is of the worm and gear type, and it is claimed that a turning radius of 14 feet is obtainable with the wheels in full lock. Sankey pressed steel road wheels are carried on ball bearings, and it is intended that the chassis shall be equipped with pneumatic tires. The wheelbase is 90 inches and the tread 32. The carrying capacity is 75 to the

G. M. C.'S IN CHINA.

Municipalities Adopting Trucks with Dumping Bodies for Garbage Collections.

That China is ahead of even the United States in some respects in the use of motor driven vehicles, is the opinion of Gleeson Murphy, vice president of the General Motors Company, Detroit, maker of G, M. C. gasoline and electric trucks. In an interview recently regarding the use to which several cities in that country had put the mechanical transport he had the following to say.

"China may have waited 4000 years to awaken from its slumbers, but now that this nation is up and doing, it has actually eclipsed us in one or two things. This is really a remarkable tribute to the people of this nation, and proves that these easterners are better able to see the advantages of modern utilities than the people of our own country. In China a number of cities are using motor trucks equipped with dumping bodies for the removal of garbage. In this respect they are alread of our own country, and the question naturally arises as to why our municipalities have not been eager to adopt the motor truck for the same purpose. The use of trucks would not only aid in the proper sanitation of cities, but would, without question, prove more efficient than the old method."

FOREIGN FIRE EQUIPMENT.

Observations of Brockton Engineer While on an Extended Tour Through Europe.

Engineer John Shaw of the Brockton, Mass, fire department, who recently completed a tour of six weeks in Europe, has some interesting things to say relative to the automobile equipment and motor driven fire apparatus in use in all the big cities of Great Britain, France, Belgium and Holland. During his stay abroad he visited fire stations at London, Liverpool, Manchester, Birmingham and Southampton, in England; Glasgow, in Scotland; Dublin and Belfast, in Ireland; Paris and Versailles, in France; Antwerp and Brussels, in Belgium; Rotterdam, Amsterdam and other places, in Holland.

"Automobile equipment and motor driven apparatus is the rule of the fire departments in the cities I vis-

ited," says Mr. Shaw. "They rather lead the American cities in this respect, but their machines are much lighter than those used in this country and each delivers hardly more than 350 gallons of water through .625-inch nozzles. The automobiles over there carry motors to pump the water, as well as to supply energy to the vehicle. One thing they use quite extensively is the portable fire escape. It is something on the principle of our extension ladders, a telescope scheme, where section after section is shot up to a height of 55 to 90 feet. Some of the fire automobiles carry one of these portable escapes, with a gig on wheels at the base and this gig can be Boulant Travelling Surgical Lat dropped off the machine and

wheeled into place as the condition may require.

"Another scheme they have is an air pump wagon, with which numerous air tubes connect to smoke helmets. The freemen don these helmets and carry their air tubes with them, something after the fashion of the deep sea diver. I do not know how the scheme works under various conditions, but they use them in places where we would have to take the hardest kind of punishment."

TRAVELLING SURGICAL LABORATORY.

Equipment That Is Complete in Every Detail for Taking Care of Wounded in Time of War.

Europe has given decidedly more attention to the subject of utilizing the motor vehicle for military purposes than has been true in this country. This applies particularly to France, although Germany is not far behind in this regard. Seemingly there has been no field of operation to which the French inventor has not devoted his energy. Accompanying illustrations present the Boulaut surgical automobile, which is in every way a modern operating room, equipped with all the accessories and fittings to make it the last word in scientific perfection.

The chassis is a Schneider, redesigned to accommodate the width and length of body which has been deemed necessary to fulfill the demands of a vehicle of this character. The motor is a 40 horsepower Schneider, and is guaranteed to propell the car to the scene of activities in the time of war at a speed of 30 kilometers (about 18 miles) an hour.

While it is contemplated that the vehicle may be utilized to accompany the troops into engagement, it has provision for establishing a permanent camp within easy access of the conflict, a tent being tolded



Boulant Travelling Surgical Laboratory, Mounted on Schnelder Chassis for Lac in Times of War.

against either side. One of the photographs presents the car thus stationed with the tent set up, and it is anticipated that this would be utilized as a reception room for patients, either before or after treatment.

The car itself is divided into three compartments, the main portion being the operating room. This is fitted with all necessary appliances, and is quite as complete in its appointments as any hospital. One of the views shows this room, with its operating table, washstand, etc., this being that booking toward the front of the machine, and the electrical apparatus in the forward compartment may be seen through the doorway.

Here also is located the sterilizing plant, by means of which sterilized water is obtained for use in the operating from, and in addition it is possible to supply the troops with 15,000 liters of such water every 24 hours. An electric pump is provided for the purpose

of taking the water from a well, poind or stream, the tractors, stated that he foresaw a good future for the energy being supplied by the motor of the automobile. The sterilizing process is by means of ultra-violet rays,

The rear compartment houses the radium apparatus, and a special device, invented by M. Boulant, permits the use of the radioscope at the operating table. Here also are cupboards and drawers for the reserve surgical materials.

The vehicle was given its preliminary tests under conditions approaching actual service, during the war office trials at Versailles, last month. Other apparatus included automobile ambulances, designed to carry from two to four patients at a time. However, greatest interest naturally centres upon the Boulant car.

GENERAL NEWS FROM ABROAD.

British 'Bus Service-The London General Omnibus Company, Ltd., in combination with the Tube



Interior of Boniant Vehicle, Showing Operating Table, and a Gilmpse of the Electrical
Apparatus in Forward Compariment.

Railways, has just inaugurated a service of 'buses from Hounslow to the royal borough of Windsor. Printed time tables have been issued and a half-hourly schelule is maintained. The service has become popular and on Sundays and holidays it has been impossible to meet the demands of the travelling public on some occasions.

American Tractors in Russia-. \ recent trial of a 45 horsepower American tractor with eight incrow plows, was made on the estate of Count Xavery Branicki, at Wilanow, six miles from Warsaw, Russia. The test created decided interest among farmers, who went from all parts of the country to witness it. Plows being worked with horses were forced to abandon the task on account of the heavy state of the ground, due to recent rains, but the tractors performed their work easily. One agriculturist, who has experimented with American manufacturer in Poland, where hand labor is becoming costlier and scarcer year by year.

Federal Truck to Japan-Futabaya & Co., of Japan, large exporter and importer, after thoroughly investigating American trucks, negotiated with M. L. l'ulcher, general manager of the Federal Motor Truck Company, Detroit, Mich., for the purchase of a oneton Federal, which has been shipped to the Japanese concern. Mr. Palcher pointed out the superior qualities and simplicity of the Federal commercial vehicles. which resulted in the sale and now believes that in the near future American made trucks will be as popular in foreign countries as are the pleasure cars produced

Automobile Service in Spain-A new automobile service has been inaugurated in Spain

be tween San Fernando, six miles from Cadiz, and Algeciras. San Fernando is connected with Cadiz by an electric tramway and excellent ferry service is maintained between Algeriras and Gibraltar. The automobiles follow the coast for practically the entire distance, making the run between San Fernando and Algeciras in about five hours, as against 14.5 by rail.

Active Year in Belgium-The automobile industry was active in Belgium during the past year, a greater demand having been developed for commercial motorcars. Of the total imports last year, 202 machines, valued at \$221,217, were from France, a decrease of 95 machines and \$116,889 in value.

as compared with 1910, Next to France the imports in 1911 were from Germany, with 58 machines, valued at \$64,746, followed by the United Kingdom with 30, valued at \$37,334, and the United States, 32, valued at \$19,903. The American machines imported in 1910 numbered three, valued at \$2218. It is expected that the imports from the United States during 1912 will increase largely, as two agencies representing American cars were established in Belgium during the last year.

British Transport Drivers-Several of the big English taxical concerns have been approached by the British war office with a view to the provision of drivers for the mechanical transport branch of the British signal corps. Many operators already have been enrolled. The men will be called upon to serve and perform duties similar to those expected of them in civil

life. When called out on mobilization, they will become in all respects soldiers of the regular forces.

Edict Against High Power—Regarding high power engines as a temptation to exceed the speed limit, the president of police of Berlin, Germany, has issued a formal order against the mounting of such motors in cabs and will refuse to license any more cabs having engines developing above 10 horsepower, according to the revenue formula.

Consul Wants Catalogues—The acting British consular agent at Quilimain, East Africa, requests manufacturers of light forms of such tractors as are capable of hauling up to two tors, to send him catalogues and any other particulars of machines which are likely to interest people of his district.

Foreign Need of Automobiles-An American con-

sul reports that there is an opening in his district for an automobile sight-seeing service, as 10,000 tourists stop, there annually. At present an unsatisfactory carriage service affords the only means of getting about. When not used for sight-seeing purposes the automobiles could be employed for various other purposes outlined in a report by the consul, a copy of which can be secured by addressing Bureau of Manufactures. Washington, D. C.

Automobiles in Arabia— The Aden-Steamer Point automobile service will shortly test a steam car that has been rebuilt into a gasoline machine. The passenger service between

Aden and Steamer Point, a distance of five miles. An English chauffeur has been engaged to make the tests and the owners declare that if the car is a success, five others will be put in service. One very steep grade has been encountered on the route and the gravelly and fluty roads have proved destructive to the solid rubber tires. It is claimed a tire is useless after it has covered 3000 miles. The posmoters are determined to experiment with different ears mut the right one is found.

Mexico Wants Motor Trucks. An American consult in Mexico reports that a company in his district is in the market for two or three motor trucks for handing ore from mines to the railways. These vehicles probably would require steel instead of rubber tires, as the roads upon which they are to operate are rough, rocky mountain stretches. They would have to be sufficiently powerful to travel short distances of 20 per cent grade. In the absence of rubber tires the trucks would have to be equipped with pneumatic shock absorbing springs in order to preserve the motor. Information and prices are requested on three, five and 10-ton ore capacity trucks. Manufactures can secure information of the Bureau of Manufactures, Washington, D. C.

New Argyll Engine—Argylls, Ltd., Mexandria, Socaland, maker of the Argyll line, has given an increasing share of its attention to the ntility side of the automobile industry, although a large proportion of its business has been in pleasure cars, hereto-fore. The latest achievement of the company is the advance in the construction of sleeve valve engines.

Motorizing Berlin Fire Department—The fire department of Berlin, Germany, now possesses 50 automobiles. It is estimated that 145 more will be needed



Boulant (ar with Tent Set, Providing Temporary Hospital Within Easy Access of Troops

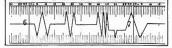
to completely motorize the department, which is being accomplished as rapidly as possible.

Leeds Wants Motor Ambulance—The American consul at Leeds, England, reports that the Workpeople's hospital fund committee is urging the need of a motor ambulance for use in emergency cases for the general infirmary. Makers of such apparatus should send their catalogues and price lists to the secretary of the Leeds Infirmary, or have their English representatives do so immediately.

Motor Mail Service—The old horse drawn van formerly used for the transportation of mail between Execter and Bodleigh Salterton, England, has been replaced by a 25-35 horsepower Darracq. It is of interest to note that last year over \$300,000 was saved on the postoffice costs by substitution of motor vehicles.

Continuing the Discussion of Modern Transportation Methods and Describing Additional Devices for Solving the Problem of Truck Management.

N THE previous discussion of the subject of recording devices for the purpose of registering the daily service of the mechanical transport, mention was made of the reasons which impelled the production of



Parties of a Samule Speedovranh Chart.

such instruments. The advantages of possessing an accurate record of the truck's movements will be appreciated readily by business men.

Not only does it prevent possible neglect of the vehicle, disregard of orders by careless and incompetent operators, and loss of time during business hours by those disposed to waste time, but it enables the owner to discover other defects in the delivery system and to take steps to remedy them. It insures that the work of the truck has been done properly and in accordance with the instructions as to speed and mileage. It insures against driving at an unlawful speed, thus reducing the liability of accidents and consequent actions for damages. It furnishes absolute proof, in case of accident or arrest, that the driver was not exceeding a proper and safe speed. And it will be admitted that all of these objects are desirable.

In addition to the devices already illustrated and described, mention may be made of the Speedograph, manufactured by the Recording Speedometer Company, 54 Clinton street, Newark, N. J., and shown herewith opened and closed at Fig. 9. It will be noted that it is a combination speedometer and service recorder.



Fig. 8—Speedograph Opened and Closed, Showing Recording Pencil Yaking Record on Chart.

When closed all parts of the Speedograph are securely locked against anyone not in possession of the The lower portion contains the speedometer. which is connected by a set of gears with the actuating device at the top. It is maintained by the maker that there is absolutely no way in which the actuating needle can be tampered with or the gear be thrown out of engagement. In this manner, the owner of the vehicle is assured of an accurate record of its movements.

The Speedograph is designed to check the time the truck leaves the garage or any given point, as well as of the return, every stop made and its duration, total number of miles travelled, the speed and variations in speed during the trip. By comparison with the route sheet it is possible to determine where each



Front and Bear Views of Jones Recorder, with and Without Speedometer Vitachment.

stop was made, and whether or not there was any delay.

Fig. 8 depicts a portion of one day's record, and in explanation it should be stated that the vertical lines indicate the vehicle was moving, while horizontal lines show that it was idle. The tape is divided into minntes, and is moved hast the pencil point from one spindle to the other at the rate of three inches an honr, this being timed accurately by clock work. The pencil point travels up and down three-quarters of an inch for each half-mile, and is operated by the wheel of the vehicle.

The above record shows that the car started at 6:03 and was run 1.5 miles at the rate of 10 miles an hour, or one mile in six minutes. From 6:12 until 6:21 the vehicle was standing. From 6:21 to 6:27 it ran 1.5 miles at the rate of 15 miles an hour, or one mile in four minutes. From 6:27 to 6:39 it was standing. From 6:39 to 6:42 it moved at the rate of 15 miles an hour for three-quarters of a mile, then at the rate of 30 miles an hour for 1.675 miles. At 6:46 it stopped

three minutes, then ran one-quarter of a mile at a 10mile rate; stopped five minutes; ran 1.75 miles at the rate of six miles an hour, or one mile in 10 minutes, and

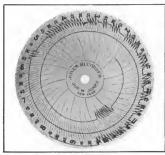


Fig. 11-Sample Jones Becorder Chart, Indicating Character of

stopped again at 7.08. Thus the record might go on for the entire day, giving the owner opportunity to follow its movements all of the time.

The Jones Speedometer Company, New York City, produces the Jones recorder, which may be furnished separately or in combination with the Jones speedometer, as illustrated at Fig. 10. The company also manufactures a hull obometer, which registers the mileage, either forward or backward. The recorder, however, is designed to supply a complete and accurate history of the vehicle's performance every minute of the 24 hours.

The instrument is enclosed in a heavy brass case and may be attached to the dash or any other convenient part of the ear. It is connected by a flexible shaft and gears to the front wheel, in exactly the same manner as the Jones speedometer is fitted. A marking stylus travels over a chart of sensitized paper, which cannot be tampered with, and which gives a permanent record of the truck's movements.

For the device, it is claimed that it is a silent watchman, which guards the interests and property of the owner at all times. It keeps the big investment from lying idle without the owner's knowledge, and eliminates all guess work. The case is locked, and no one can have access to the record except the party who carries the key. The start, stops and their duration, mileage between stops, speed at all times, and time of returning to the garage are set down in a manner even more accurate than would be possible were the vehicle accompanied by a private detective, it is claimed.

While the vehicle is standing the chart is constantly travelling under the marking stylus, the record of a stop being shown by a continuous line. The length of this line indicates the duration of the stop. The running time is shown by cross or zigzag lines, each one of which indicates a half-mile of travel. The speed for the run is calculated by counting the number of zigzag lines made in a given period of time.

Fig. 11 presents one of the charts, and in explanation in may be said that this chart was put on at 8:15. The record shows that the truck was running as follows: 9:45 to 10:37, 95 miles: 10:45 to 11.1 (three miles: 11:45 to 11:37, four miles; 11:45 to 12:05, 275 miles: 12:45 to 12:35, 425 miles: 12:47 to 1:15, five miles: 12:30 to 2.752 miles: 2:15 to 2:35, three miles: 2:45 to 2:55, two miles: 3:30 to 3:22, 3.5 miles: 3:33 to 4:50, 44.5 miles: 5:30 to 5:35, 3:25 miles. There were 12 stops. The truck was out of service for 16:5 hours and then ran again from 10:35 to 11:38, 9:25 miles. The chart was removed at 2 with a total run of 7:125 miles. The average speed was 11 miles an hour. The running time was six hours and 25 minutes and 25 minutes.

Still another device of this character is the Veeder hab dometer, made by the Veeder Manufacturing Company. Hartford, Com. This differs from those previously described, in that there is no chart, the main object being to disclose the mileage obtained from the truck or other vehicle. Additional details of the car's movements are possible of computation, however, and the company states that a reading of the register will give the owner all the essential information.

The illustrations at Figs. 12, 13 and 14 show the instrument, its method of attachment and the interior mechanism. A small spur gear is used to drive the odometer. A shank on the side of this gear is unserted in a hole in the end of the asle. The cotter pin which locks the nut, passes through this shank and prevents the gear from turning of becoming loose. This gear



Pla, 12—Verder Hab Odometer Scaled in Place on Vehicle Hab, meshes with the spur gear shown in Fig. 13, and suitable mechanism inside the cap, Fig. 14, drives the register always in the same direction, so that the entire

distance travelled by the car, whether forward or backward, is recorded.

It is maintained that there is no way to take the



Pig. Godinner End of Hub Odameter, Showing Spur Genr and Set Serem.

instrument of except by unscrewing it from the hub. This can be done only after the set screw, shown in Fig. 13, has been withdrawn sufficiently to permit the cap to be turned, an operation that cannot be accomplished without first breaking the seal, depicted in Fig. 12. This seal is the same in form as that which has been used for many years by railroad people and is held absolutely to prevent tampering with the odometer without the owner's knowledge.

While the device may be attached either to the right or left hub, the latter is recommended by the maker, because the left wheel is less liable to come in contact with the curb, posts, etc. It can be used on any wheel having a dead aske.

As has been explained the odometer is designed so as to record the distance travelled, no matter whether the car is going forward or backward, so that it is impossible for the driver to substract mileage by jacking up the wheel and running it backward. It is held that there is no way to disconnect the mechanism by slipping the gears out of mesh.

The hub odometer has been found an exceptionally valuable instrument for cars of all types, whether utilized for pleasure or commercial purposes, and particularly on taxicabs. It is obvious that with an exact record of the mileage available at all times, the owner is in possession of data which will aid materially in computing the cost of motor handage.

The Harwood & Bailey Company, with factory location in Marion, Ind., among the more recent truck manifectures to enter the field, has produced a twoton vehicle in addition to the one of 1.5 tons capacity, which it first started to make. The new machine was demonstrated on the streets of Marion recently.

VELIE HAS PERFECT SCORE.

Lient, Bubb of the United States Army recently retently the three-ton truck, made by the Velos Motor Vehicle Company, Moline, Ill., in war service. The truck run was held under the direction of Capt, Williams of the United States Army starting at Dubuque, Ia., and finishing 20 miles out of Madisson, Wis, where the army went into camp. A perfect score was reported for the entire trip. The first run of the vehicle was from Moline, starting at 5 in the morning and arriving at Dubuque at 2 in the afternoon, a distance of 86 miles, when it was at once put into service. It was used in the tests for handing supplies for 2200 soldiers, and many times was found useful in assisting horse drawn trucks which had become stuck in said and mud.

PEERLESS AMBULANCE SUCCESSFUL.

A new 30 horsepower, four-cylinder Peerless combination police patrol and ambulance was recently placed in commission in the city of Medford, Mass, and has already successfully demonstrated its efficiency over horse drawn vehicles. It has reduced the time required to reach any of the city's boundaries from 20 to about five minutes. A saving has also been made in starting as well as in travelling. But one man is required to run the machine, where hereto-fore an extra man had to care for the horse which drew the ambulance. It will answer alarms of fire as well as police and regular calls. The automobile is equipped with a



Fig. 14—Shadow View of Hub Odometer, Attached to Axle, and Showing Operating Mechanism.

first aid to the injured kit and will have two stretchers when used for ambulance purposes. Fire extinguishers loaded with chemicals are carried in front.

WILL LICENSE MAKERS UNDER DYER PATENTS.

Automobile Board of Trade Enters Contract with Enterprize Automobile Company, Affecting Rights to Use Sliding Gear Transmissions.

NDER date of Aug. 13, the Automobile Board of Trade announces an arrangement between it and the Enterprize Automobile Company of Hoboken, N. L, granting to its members licenses to operate under the so-called Dyer patents, numbered 643,595, 657,650, 662,400, 662,401, 676,223, 886,986 and 921,963. Incidentally, it may be remarked that the contract also includes the right to licenses under any automobile patents that may be granted in the future to Leonard H. Dyer, to whom the patents named above were originally issued. The commercial vehicle industry appears to be affected in like manner as the manufacturers of pleasure cars.

It should be stated that the five patents first enumerated were acquired some six years ago by the Patents Holding Association, then a subsidiary of the Association of Licensed Automobile Manufacturers, which was succeeded by the Automobile Board of Trade soon after the adverse court decision in the socalled Selden patent cases in January, 1911. These have now been turned over to the Enterprize Automobile Company as a part of the consideration mentioned in the contract. L. H. Dver is president of the Enterprize Automobile Company, having been elected recently to succeed John R. Taylor, with whom he has been associated in the practise of patent law since 1897.

Patent 643,595 was granted Feb. 13, 1900, and is held to cover two gears and an intermediate epicyclic gearing interposed between one of the gears and the driven axle. Antedating this a trifle in the matter of application is patent 657,650, which was granted Sept. 11, 1900, and is held to cover a fixed guide plate with recesses and notches to hold the gear shifting lever. Patent 662,400, granted Nov. 27, 1900, relates to the subject of two shafts with spur gearing and means for intermeshing the gear wheels so as to transmit power from the driving to the driven shaft. Patent 662,401 is for a multiple speed transmission gearing, and is similar to the main patent, described below except that the gears cannot be shifted as an entirety and the principle of direct drive with all gearing quiescent is not covered. Patent 676,223 is held to cover a removable rigid bridge to carry the motor and operating parts.

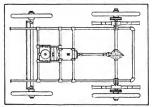
What is termed the main patent is that numbered 885,986, for which application was made Ian. 22, 1900. and which was issued April 28, 1908. This is claimed to extend backward in its effect to Feb. 3, 1900, inasmuch as it is declared to be a division of an application for a patent filed that date, which was later granted as patent 921,963 under date of May 19, 1909. This last patent is claimed to underlie the so-called main patent as a sort of foundation for it, and is held to cover improvements in the frame, driving gear, and changing and reversing mechanism of a motor vehicle.

It will be noted that the so-called main patent has very nearly 13 years to run, and inasmuch as this is the patent held to cover practically all forms of sliding gear transmission now in use on motor vehicles in this country, it will prove of interest to study the claims, which are 57 in number. The sketches presented herewith are taken from the original patent drawings and in connection with the claims set forth the entire situation with respect to patents 885,986 and 921,963. The latter has but three claims and reads as follows:

Claims of Patent 921,963.

(Islams of Patent EZI,DES.)

1-The combination is a relative day a synthe supported frame, driving in a relative day a synthe supported frame, driving the said of their six particular and in the width the shall be sufficiently reason between the width the shall be sufficiently reason and in the width the shall be sufficiently as a squal as further critical connecting the shall in the money, a second shall be sufficiently as a special shall be sufficiently as a special shall be sufficiently as a sufficient shall be sufficiently as a sufficient shall be sufficiently as the state of the shall be second shall without reduction in special sense for the shall be sufficiently as reversing our for criterians did not fined of the widthest sufficient a reversing our for criterians did not state of the widthest sufficient as reversing our for criterians driven and the width shall be sufficiently as sufficiently as well as sufficiently as s



Showing Location of Dyer Patent Device, Looking Down a Motor Vehicle Chassis.

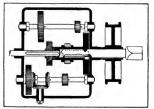
mpon a motor Vehicle Chassis.

Metico cists courseting the slat in the motor, a record shaft lies with the first shaft, means for directly connecting the two shaft between the connecting the two shaft between the connecting between the two shafts and the connecting between the two shafts and the connecting the connection in the connection in the connection of the connection in a vehicle or a sweep superformance of the connection of the connection in a vehicle or a sweep superformance of the connection between the two shafts and for connection of the connection of

Cisims of Patent 885,986

In-line of Patriot 1888,088.

1--in a transmission for more wideles, the combination of a driving the production of the patriot, the combination of a driving rather of intermediate pean, including a creening pear and means a control of the patriot of the patrio

the six of said shaft and driver by said member, and a shiftable trans-lements of the said shaft is the said shift as the said six of the said shaft is the said shaft in the said shaft is a correct direction. 5—1a a translation cast for a motor vehicle, the combination combination of the said shaft is the said shaft in the said shaft is said shaft in the said shaft in the said shaft is said shaft in the


Dyer Patent as Applied to Low Speed and Reversing Gears.

one direction of movement transmitted from said driving member to said driving member to said driving member to said driving member to said driving said. A plurality of first districtation gave, noticelling a revenue of the said production of the said that a plurality of first districtation gave, becoming a revenue of the said that the

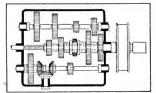
ly abliance as an exercise of the comprising a drive. In-Transmission mechanism for motor vehicle comprising a drive. In-Transmission derive on said shaft, means for compiling and driving means read and drives shaft use to the other for the direct drive of the read and drives shaft use to the other for the direct drive of the shaft and transmission drives the reagenment with the said one shaft mach transmission drives the reagenment with the said one shaft mach transmission drives the reagenment with the said one that the compression of the c

of shift level, threatments are level the engagement with the unit could be a second of the second o

and derives members inspected and its very the word and direction of the property of the prope

duced speed gearing for positively driving the driven shaft at a re-duced speed and means for sugaring the said reduced speed gearing, the said reduced speed gearing helag entirely disconnected when not in new, and being introduced and disengaged by a longitudinally aliding

deced speed parting for positively driving the driven shaft at a function of stores and smart for sampling the safe relation of the saf



Additional Forward Speeds Obtained by Addition of Ex-tra Secondary Gears on One of the Anxiliary Shafts, Together with Others on Main Driving Shaft.

25.—In a motor vehicle, the combination with a shaft made is two parts of a gare case, howfram on the part case for the shaft parts a clutch made in two parts and conserting the two shaft parts, one of the clutch parts shifting upon its supporting shaft parts, a gar connected shaft part and rotating with it, and maxiliary shaft, sensent in tright parts are connected in right parts and rotating with it, and maxiliary shaft, sensent in tright parts, and connected in right parts and p

seems carried within the gear case for aliding the moving clutch part and its companion gear to disengage the two shaft parts and engage the gear with a gear on the auxiliary shaft to cause the two shaft parts to rotate in a different speed relation.

series to contact in a different speed relation. The above the same speed and the same sp

a different speed relation.

30-1.4 motor vehicle having driving wheels a motor is short in
shaft to retain at the same upond in the motor, the shart heigh dependent of the same to the same upond in the motor, the shart heigh dependent products and officed have been shared to the same upon the same that the same upon the s

40 the first shart and actuating the clutch. 22—Transmission for a motor vehicle, having a shart formed of two party, one telescoping within the other, connecting a clutch, a gar-gar party of the control of the connecting a clutch, a gar-gar lett freely rotatable with respect thereto, a second shart, and crars thereon and a single lever for shifting said first grars, and ac-tuating the clutch.

training the elastic.

33-11 a motor validic, the combination with a shaft fermed of
33-11 a motor validic, the combination with a shaft fermed of
the shetting ends of the two parts, a good forced integral with the
tellistic and capacity with one parts, a second good formed integral with
the control of the control of the control of the control of the twothe grant of the second shaft, and means for melting the
twees the grant on the second shaft, and means for melting the
twees the grant of the second shaft, and means for melting the
twees the grant whereby the two parts of the shaft may be crossed
to relate in different specifically.

is relate in different apped relation.

34—Transmission genering for a moior vehicle having a shaft formed of two parts, one felectoping within the other, a connecting oran, a slevet hieron, connecting with, but freely rotatable with reject to the first gars, a second shaft with gears thereon and a single-sliting lever for siding first gars and discapaning the clutter.

35—In a motor vehicle, a gear case therefor, having a cover and supporting brackets, with a set of common secoring boils.

supporting oraces, with n set or common securing poits.

36—La newort vehicle, a combination of a shaft therefor, formed
the set of the security of the securi

sugger like clutch and inference the parts worthink, about, termed in worst of control to the control of the co

aid case the shaft's parts to retars is opposite directions.

3b—th a more valide, the conduction with an operating motor,

3b—th a more valide, the conduction with an operating motor,

the property of the state o

retars in different speed relations.

3—in a money valiel, the combination with the driving shaft
made in two parts, of the clatch consecting the two parts, is siever
with the clattch, as exceed grant formed integral with, the
siever and engaging with the other part, and an samilary
slatt, gars thereon, discupped at the high speed, and most of carstart, gars thereon, discupped at the high speed, and means for surstart, gars there with the parts of the shaft may be caused
to rotate in different speed relations.

untermote the genra, whereby the two parts of the shaft may be caused within a most or which, the combination with the driving shaft will be shaft to the shaft may be considered by the driving shaft will be shafted as a considered part of the vice better a part formed integral with the chart, as even for error of integral with the chart, as even for error of integral with the chart, as even for error of integral with the chart of the vice of the

profits a more value, the combination with a more and derive about, or commencium between will more and the driving sharely, is inding a two-piece sharft, a clutch consecting the two sharf pieces, are upon the sharft pieces and auxiliary sharf with gears thereon, are reported as the pieces and auxiliary sharf with gears thereon, is reagend, an element loogitudinally shiftship as on colitory for ex-tensing said clutch and intermeding said gears, substantisty as set

43.—In a motor vehicle, the combination with the shaft formed a two parts, one telescoping within the other, of a connecting clutch, gear integrally formed opon one clutch member, a second gear consected to the first gear but freely rotatable with respect thereto, a sec-

end shaft, and gears thereon, and a single lever for shifting said first gears and actuating the claich, assuming the claim of the companion of the form of the companion of the companion of the claim of the formula (two parts, of a first claim occuber one part, shifting claim number on the other part, a gear rightly connected to said shift any analysis of the claim of the claim of the claim of the claim analysis of the claim occuber and connected grara along the shaft in diswarges the claim occupied of the claim of the claim of the claim of the claim of the deline and the claim of th

edict and liversesh the genry.

Annual section of the control of t

to relate its uncereal spece reasons.

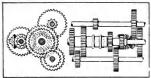
The desired is uncereal spece reasons. The device wheels, under two longitudinally aligned sections, a cluich arranged to coople the excitons as that the defring affect may now as a centery and longitudinally aligned sections. As an entirely and longitudinally aligned sections, and one constraint of the definition
versa. "In combination in a charge-speed mechanism, a dering shot that the speed measured measured derives and derives about measured measured measured derives a latermediste grave on an axis in Sted relation with the axis of deriving and driving shot amount of the speed of the

owing sed drives sating with all informediate gears at rev.

4th—In combination in a change-speed mechanism, a driving sed a
dependent movement, change greats carried speen the driving and drive
shafts, means for varying the position of said gears, power transmitting
driven badt and a clutch mechanism for directly connecting said drive
inp and driven shafts.

ing and drives shafts.

49-In combination in a change-speed mechanism, a driving shaft, a gear before upon said shaft, a constrehaft, a gear before upon said shaft, a constrehaft, a gear before opon the counter shaft and meshing with the gear apon the driving shaft, and driven shaft operatively arranged with relation to the driving shaft and provided with a clatter mechanism adapted to clatch it directly



Views of the Device as Seen from Above and from One

to said shaft, and intermediate gears borne upon the driven shaft and counter shaft, ubereby the speed of the former may be varied with relation to the speed of the latter.

50—in combination in a change-speed mechanism, a driving shaft driven shaft, a driving great for the former, a plurality of inter-diate greats including a reversing great and means for driving soid twen shaft through any one of said intermediate greats.

51—in combination in a change-speed mechanism, a driving shaft drives shaft, a plurality of transmission gears mounted to slid-errom, a plarshity of intermediate gears arranged to engage and driv-spectively, but slagly, the said transmission gears, and means to uple said driven shaft directly to said driving shaft.

couple said criven sant circuity to said driving sant.

52-16 a motor vehicle, the motor, clutch, driving gear and driven
sharf, all oxially aligned, means to drive said driven sharf from said
driving gear at the same and also as different speeds, o her sharf are
ranged at an angle with said driven shaff and driven therefront, and
vehicle driving wheels connected with and driven from said jack shaff.

which driving Washa considered with and driven from said just shalf in a driven shalf, a counter shalf is fast entertainty and driven sharf, a siderou shaff, a counter shalf is fast entertainty and driven sharf, and deprint the property of the sharf, and include the sharf to be shared to the share of th

consecting said consists, driving and artists sharts and the So-lin combination in a change speed mechanism, a driving shart So-lin combination in a change speed mechanism and driving the driving shaft, and means merable on the driving shaft to sensing the surveyed and of the driving shaft to return the two changes of the driving shaft to return the two changes of the driving shaft to artist be two shafts at the sums speed, shafts and a plurality of getra connecting said counter, driving and driven shafts.

outron shafts.

56—in combination in a change-speed mechanism, a driving shaft and a driven shaft axially sligned, a counter shaft in fixed relation to said driving and driven shafts, a plarnity of crars consecting said conster, driving and driven shafts, and including casing, a b-aring in said casing for one and of the driven shaft.

is said easing for our end of the drives hasht.

57—1a a transmission mechanism for motor rebicles, a raving a
riving shall we shall nevertise protecting its said reading at one side. I
shall not shall never the shall never the shall never the shall never the
shall never the shall never the shall never the shall never the
shall never the shall never the shall never the shall never the
shall never the shall never the shall never the
never the shall never the shall never the shall never the
parts on said shall whereby varying speeds are transmitted to a shall
projecting from and online.

TABLE OF CONTENTS.

Page	
*Motor Trucks Economize Ice Haulage	British Bus Serv
What It Costs to Malotain Horses	American Tracto
Load Rating and Chassis Weight	Federal Truck l
*Peerless for Porto Rico	Active Year in 1
Interesting Tire Test	British Transpor
Mals Company Reorganized	Edict Against Hi
Flanders to Enter Field	Consul Wants C
*Appointed Sales Manager	Foreign Need of
Another Three-Wheeled Car	Automobiles in
Marmon Truck Announced	Mexico Wants 3 New Argyll Eng
Three-Too Model Coming	Motorizing Berli
Schacht Worm Drive Model	Leeds Wants M
Jones Speedometer Expanding	Motor Mail Serv
Midsummer Truck Show	*Recording Devices
*Latest Gramm Developments 577	Velle Has Perfect
*The A B C of Motor Truck Ignition, C. P. Shattuck., 578	Peerless Ambulance
*G. M. C. In Market Gardening	*Will License Maker
*Macks in Lumber Haulage	*Indicates articl
*Peerless Self-Dumping Body. 583 *Adams for Lighting Service. 584	
*Another Worm Driven Truck	INDEX
*Pierce-Arrow Coal Figures	Accessory and Garn
Editorlals—	Anderson Electric C
Problem of Efficiency	Available Truck Co.
Seeking Motor Truck Data	Automobile Journal
The Army Manoeuvres	Baldwin Chain & Ma
Boston's Great Electrical Show	Bessemer Motor Tri
*Electric Truck in Junk Haulage	· Borne, Scrymser Co
*Electrics by the Train Load	Boyd, F. Shirley
	Bretz Company, J. ?
*The VC 300-Pound Truck Chassle	Couple-Gear Freight
*Regarding Chassis Rating	Eagle Oll & Supply
*Trucks in Connecticut Army Manoeuvres	Electric Vehicle Sho
*Municipal Service Department—	Federal Motor True
Fire Chiefs' Convention	Electric Vehicle Sho
Koox for Country District	
White Protective Wagon	General Motors Tru
Experience of Passaic	General Vehicle Cor Goodyear Tire & R
Bond Issue Assured	Grand Rapids Motor
Figures Indicate Economy. 612 Webb Company Reorganized. 613	
Webb Company Reorganized	Havelice Oil Comp.
Cartercars in Milwaukee	
Cole Roadsters for Fire Service	Jarvis-Huntington
Bulletin for City Officials	Kinsler-Bennett Co
Kissel Kar Proves Satisfactory	Knox Automobile (
Pittsfield Orders Aerial Trucks	Lynch Manufacturii
Motor Police Patrol for Binghamton	
In the Market	Marburg Bros., Inc
Springfield Adda Lifesaving Car	Mea Magneto Motor Truck Body
Motor Ambulances	Motor Truck Body
*Hints for Proper Maintenance-	
Bypasa Device for Carburetors	Perfection Spring C
Increasing Size of Reamer	Itepublic Rubber C
Utilizing Girders for Shelf	Royal Equipment C
Planetary Transmission Tips	Rutember Motor Co
Carver Portable Drill617	Splitdorf Electrical
Victor Portable Tire Inflator	Stewart Motor Truc
*('orrespondence	Sullivan Motor Car
Pitch of Gears and Measuring Devices	Trade Information
Tungsten Steel and Magnets	
*Foreign Truck Notes of Interest—	United States Tire
British Front Drive Pilgrim620	V. C. Motor Truck
G. M. C/s In China	Victor Motor True
Foreign Fire Equipment	Westfield Motor Tr
Travelling Surgical Laboratory	White Company, T

	Page
British 'Bus Service	622
American Tractors in Russia	
Federal Truck in Japan	622
Automobile Service in Spain	622
Active Year in Belgium	622
British Transport Drivers	622
Edict Against High Power.	623
Consul Wants Catalogues	623
Foreign Need of Automobiles	623
Automobiles in Arabia	623
Mexico Wants Motor Trucks	623
New Argyll Engine	623
Motorizing Berlin Fire Department	623
Leeds Wants Motor Ambulance	623
Motor Mail Service	623
*Recording Devices Reveal Efficiency	624
Velle Has Perfect Score	626
Peerless Ambulance Successful	626
*Will License Makers Under Dyer Patents	627

e is illustrated.

INDEX TO ADVERTISERS
Accessory and Garage Journal
Holdwin Chain & Manufacturing Company. 12
Couple-Gear Freight-Wheel Company
Eagle Oil & Supply Company 9 Electric Vehicle Show 11
Federal Motor Truck Company. 5 Kleetric Vehicle Show Number. 11
General Motors Truck Company 6 General Vehicle Company 10ver Goodyear Tire & Rubber Company 11 Grand Rapids Motor Truck Company 13
Havolice Oll Company
Jarvis-Huntington Automobile Company
Klnsier-Bennett Company, The
Lynch Manufacturing Company11
Marburg Bros., Inc. 12 Men Magneto. 12 Motor Truck Body Company. 13 Motz Tire & Rubher Company. 13
Perfection Spring Company12
Republic Rubber Company 16 Royal Equipment Company 16 Rutenber Motor Co., The. 11
Splitdorf Electrical Company 9 Stewart Motor Truck Co 1 Sullivan Motor Car Company 13
Trade Information Exchange
United States Tire Company
V. C. Motor Truck Company
Westfield Motor Truck Co., The

VOL. III.

PAWTUCKET, R. I., OCTOBER, 1912

No. 10

THE 1912 BOSTON ELECTRIC SHOW.

Motor Vehicle Department a Great Feature of a Wonderful Demonstration of Electrical Possibilities, and Ideal Garage a Splendid Education—Exposition a Magnificent Spectacle, Especially with the Night Illumination.

OF ALL the industrial expositions held in Boston mone approached the 1912 Boston Electric Show, which was inaugurated in Mechanics' building. Huntington acenue, the evening of Sept. 28, and which will be concluded the night of Oct. 26. When this measure is applied and comparison made with former exhibitions it is with keen realization of their magnitude.

tude, but from every viewpoint the show is more s peet acular and has a broader scope. for it is a d e m o n stration of the possibilities of utilizing electric energy for light, heat and nower. There is not a person who has not more or less conсегп science, industrial and domestic arts. and besides these attrac-

arc innumer-

HEIMEN

tions there Mechanics' Building, Where the 1912 Boston Electric Show is in Progress, and Hunt-

able progressions through the application of electricity that cannot fail to centralize the attention of the visitors.

One of the features of the exhibition is the fact that during its progress all displays and demonstrations will be by artificial light, for daylight has been excluded from the building, and by night the great structure is brilliantly illuminated, the exterior being outlined by thousands of constant and intermittently lighted lamps. The visitor to the Back Bay is at a distance impressed by the diffusion of light in the direction of the exhibition building, and wene approach is made from Boylston street or Huntington avenue the sky is lighted as though by a conflagration.

Seen from Copley square, Huntington avenue is ablaze with myriads of ine a n de scent lamps that ontline the show building, and on either side of the street to Massachus e t t s avenue are towering poles that are s u r m ounted by groups of lamps with v a r i-colored globes that make the t h oroughfare as bright as day. Along the back of

the hall in letters 20 feet in length hundreds of lamps blaze out "Electric Show," and festoons of lamps extend from the roof to the ground and in graceful designs, following the general contour of the architecture. Along the front of the structure the same general idea is carried out, the porches being defined by the vertical and horizontal bines of lamps. and the tower at the north end is shown in outline by lines of twinkling colored lights that instantly attract. Lamps of all colors and all sizes illuminate the street in a manner quite bewildering to the staid Bostonians, and the transition of the usually quite acune to the most brilliant of all "white ways" cannot fail to impress one.

While the exhibition building delights and surprises all who have seen it when illuminated, and this spectacle in itself is well worth the time taken to visit the avenue, the most that can be said is that this makes great promise for the visitor. Those who attend through idle curiosity cannot be else than delighted with the immurerable features, but those who have interest will find a visit a decided education in electrical unity. There are few uses for electricity is indispensable, and the Boston Edison company serves 37 towns and cities outside of Boston itself, its light and power lines cobweb an area of 550 square nules, in which dwell 1,500,000 persons, while its plant represents an investment of more than \$30,000,000.

So diversified are the uses for electric current, so conomical is its utilization, and so large are the possibilities for developing its consumption because of its value for lighting, heating and power, that the show was organized for the purpose of bringing together and displaying all useful and practical electrical appliances and devices to demonstrate their adaptability for varying requirements, and to give manufacturers opportunity to show the practicality of their productions in actual service to those who had or might become interested in them as business propositions.



The Main Alair to "The Park," the Section of the 1912 Boaton Electric Show That is Beanted to the Display of Pleasure and Service Vehicles.

that are not demonstrated. There are innumerable purposes for which it is available and may be economically utilized that can be realized only through observation of each separate exhibit, and some of these demonstrate processes that evidence the wonderful development in electric applications.

The organization of the exhibition, the financial responsibility of its management and the establishment of its policies, as well as actual supervision, has been and is directed by the Edison Electric Illuminating Company of Boston, and the result is a show that is maintained to be the greatest of the kind ever attempted in America. There are few who realize the magnitude of the business of this great corporation, nor the enormous factor it is in every phase of industrial, commercial and private life. Today electric light In the organization of the show ample time was taken to insure a full representation of exhibitors. Endeavor was made to create interest in foreign countries, and the event was given publicity in Europe and Japan. For approximately two years the management consistently promoted it, because it was desired that it should per not only complete and comprehensive, but it should represent every practical electrical utility. It was realized that it required time for the preparation of special exhibits, and while scientific advancement was desired when represented by a practical device or apparatus, mere engineering development was not sought.

The management of the show has been directed by H. W. Moses, who has the assistance of Chester I. Campbell, who has been general manager of practi-



Light Service Vehicles Constitute the Hispiny of the General Motors Truck Company

cally all of the motor vehicle and motor boat exhibitions held in Boston, as well as having large experience with similar shows in other cities and with differing forms of exhibitions in Boston. It will be realized that the exposition is not only well managed, but it has every feature that will appeal to the public.

In connection with the show was organized an electrical vehicle department, and this, with the exhibits that are directly connected with vehicle equipment, is maintained to be the largest exhibition of electric carriages, wagons and trucks ever held in America. It is this particular section of the show that is interesting to all persons who are studying, investigating or engaged in highway transportation. In fact at all previous motor vehicle exhibitions the electrics have been subordinated because of the great number of other types, and have been given but incidental attention. The purpose of creating this division was that the builders of electric conveyances would have opportunity for showing and demonstrating the qualities of their machines, and to bring them to the attention of thousands of business men who were desirous of making their enterprises more attractive and consequently more productive.

Though there are now more than 50 different firms

The First Minnie Machine Exhibited at Boston is a Five-Ton Truck, with a Wagon Expected Later.

and companies engaged in building electric vehicles the industry has not as yet reached a magnitude when it can systematically support and encourage exhibitions intended solely for the promotion of the use of electrics, and it may be further stated that many of the manufacturers have but recently begun production and have not as yet maunfacturing capacity to instify exploiting more than a small part of the market of the nation. This being so it is very satisfying to the management of the show and a decided credit to the industry that more than a third of the companies are represented in the exhibition. The department is made the more creditable through the displays of some of the best known battery makers of the country, and in addition to this there are exhibits of vehicle and garage equipment that are in every way interesting.

If for no other reason than to inquire into the possibilities of electric transportation, the 1912 Boston Electric Show has a feature that should appeal to every person, for there is no one who does not directly or indirectly have to bear a proportionate part of the enormous amount that is annually paid for hanlage by highway. There are innumerable features that must appeal to thinking people, but these are incidental to



The Exhibit of the Lunsden Company is Composed of Delivery Both Pleasure and Industrial Detroits Are Exhibited at This Wagons,

the general proposition of mechanical vehicles, to the promotion of which the MOTOR TRUCK is devoted.

The show is unusually attractive because of the decorations. These, following a policy that has been accepted with practically every exhibition in Mechanics' building, vary with each department, and the visitor passes from the one section to another and notes with interest the changes in the settings in which the displays are made. To illustrate, entering the building at the north entrance the north section of Machinery hall is representative of a manufacturing section, the effect being the front of a factory building, showing the cement walls and the open windows, the spaces being marked by columns that are surmounted with vases of artificial flowers illuminated with electric lamps. The ceiling is draped with azure blue to represent a sky. Each space is divided by an ornamental rail 30 inches high. In this every exhibit is different.

The south section of this hall is given over to the

front of the hall is suspended a painted drop that represents a valley in the mountains with a lake and a river between wooded heights, and the ceiling is draped to represent a sky with the roof trusses covered with painted scenery that suggests the archine branches of trees. The band balcony is in sharp relief against the painted drapery on the sounding board, the balcony being decorated with white to suggest a terrace. The upper gallery is shut off by representations of cottages at either side of the hall, the purpose being to exclude all light from without the building. There are four rows of seats in the gallery available for those who desire to rest and to observe the exhibits from a distance. On the main floor the exhibition spaces are separated by rails 32 inches high, and the main divisions are marked by large white columns that support lanterns in which are 500 watt mazda lamps. The stage is given over to the Castle Mazda, which has the arched entrance with a raised portcullis and the traditional turrets and recessed windows, this erea-



 D. Gibbs, Superintendent of Advertising for the 1912 Boston Electrical Show.



W. H. Mikins, General Superintendent Hoston Edison Himminsting Company.



11. W. Voses, Manager of the 1912 Boston Electrical Show.

electric vehicles and it is representative of a park, being separated from the other part of the hall by a solid railing representing a cement wall, the aisle entrances being marked by six large bronzed griffins, each of which supports a flambeau. The spaces occupied by the exhibitors are divided by similar rails with green caps, and at the entrance to the spaces are representations of brick posts surmounted by small square tubs in which are trimmed box shrubs. The rail of the large light well of the hall is covered with a representation of a stone wall overgrown with natural and artificial flowering vines, and from the rail to the apex of the well are suspended festoons of colored lights. This department, however, is not sufficient to show all of the exhibits, and several of the late applicants are to be seen in the basement, close to the model garage,

Grand hall is elaborately decorated to represent a German village and viewed from the eastle located on the stage the display is unusually attractive. At the tion being of papier mache. This department is representative of the electrical interests and the electric supply houses of Boston.

In the hall above Machinery hall the front of the section is generally given over to the central stations of New England, a number of which have headquarters to receive visitors and where their representatives await the opportunity to assist and advise those who may be interested in any of the electrical displays. The remainder of the section is occupied by a diversity of exhibits. The spaces are divided by rails and the walls are covered with oil paintings depicting country scenes. The aisles are indicated by large plaster posts that carry 10-inch globes containing large mazda lamps. which constitute the principal illumination of this department. The case is decorated to represent a baronial hall, the walls being hung with tapestry and the ceiling being beamed, and the walls are hung with armor, spears, shields and other arms. There is a mammoth fireplace in which are large logs glowing, this being an attractive electrical effect.

The basement in part under the electrical vehicle display is given over to the garage, this being fitted to accommodate about 25 machines. This is one of the features of the exhibition from the viewpoint of the manufacturer, distributor, owner and user of industrial wagons, and it was established with a view of demonstrating the practical and conomical methodof caring for and maintaining electric vehicles.

This garage is decidedly ornate for a station in which business is to be carried on, the walls covered with burlap and the space defined by walls of marbleized compas board, with the columns enclosed in panels of the same material. The cleanliness is noteworthy and is in sharp contrast with the machines that are driven in after the day's work on the high-

The station is fitted with the most modern facilities, including a charging board consisting of three panels of six circuits each, four Westinghouse and two General Electric rectifiers, a Wagner rotary charging converter and a General Electric motor-generator set. Besides this there is a wash stand, a bench and the necessary tools for making light repairs.

The work is directed by E. S. Mansfield, who is manager of the Atlantic Avenue Electric Garage, and there is a force of capable workmen in attendance. The vehicles are given systematic attention and are maintained to the standards of the manufacturers, each machine being washed, cleaned, polished, oiled, greased, adjusted and inspected, and repaired so far as the facilities will permit should there be occasion. The work is carried on by a system that is regarded by the management as being sufficient to obtain satisfactory.



The turning in the Basement of Mechanics' Building, in Which the Proper Care and Maintenance of Electric Vehicles in Demonstrated to Visitors at the Show.

ways. In this garage is maintained a fleet of wagons and trucks owned by business interests of Boston, that have promoted the show to the extend of garaging their machines there. Practically all of the wagons are kept in different stations, but when the management of the show proposed that a garage be conducted in connection with it, for the purpose of demonstrating the manner in which electric vehicles should be cared for and maintained, the owners unhesitatingly supported it.

The service of the garage was also placed at the disposal of the exhibitors that they might have demonstrating vehicles within instant reach, and benefit not only their customers with this service, but the Boston Edison Company could promote the establishment of public and private garages by demonstrating the possibilities and the requirements as to garage equipment. factory results from the viewpoint of service.

This garage, its system, its methods, its equipment and its work are open to investigation by any interested person, and visitors are urged to make inquiry and to learn for themselves the facts that experience has developed. The garage is well filled each night and is practically deserted each day, so that the time when the station is most attractive for the visitor is the evening, after the machines have been garaged and the work is in progress.

The work in the garage continues day and night without interruption, and this portion of the exhibition is constant, although visitors do not remain after the usual lour for closing in the evening. The opportunity for obtaining first hand information relative to electric vehicle service requirements cannot be realized until a visit has been made to the station and its methods observed. The garage is a means for education that no business man should neglect.

The remainder of the basement is given over to a diversity of electrical exhibits of a general character, and of these not the least interesting is the stand of the Edison Storage Battery Company, where a miniber of the processes of battery making are demonstrated, component parts of the hatteries are shown, the making of nickel plate is carried on with miniature apparatus, a battery is short circuited at will without injury, and the cells of a five-cell battery are raised and dropped by a cion apparatus to show that the batteries are not affected by jolts and jars. In the centre of the stand is a mammoth representation of an Edison battery cell formed by glass in a frame, the whole being illuminated by a lamp of large capacity. The nickel plate production is of great interest, this showing the methods that were devised by Thomas A. Edison at an expense of \$1,200,000 to produce the plate

Exhibitor Address

146—Flanders Manufacturing Co., Pontiac, Mich. 169-170—General Motors Truck Co., Defroit, Mich. 137-138-139-166—General Vehicle Co., Long Island City. 123-126—Lansden Electric Vehicle Co., Boston, Mass. 138—John Electric Car Co., Toledo, O.

338—30ho Electric Car Co., Tofedo, O. Civechand, O. Guerland, C. Arrigae Co., Civechand, O. Marcia Carling Co., Civechand, O. 1326-137—Tyler Brothers Corporation, Brookline, Mass 137-148—Walker Vehicle Co., Chienzo, III. 466-445—Warriey Chysics, Marcia Carling, Mass 147-148—Walker Vehicle Co., Chienzo, III. 466-445—Warriey Company, Indianapolis, Ind.

The exhibitors of batteries and electric vehicle equipment were the following:

171—American Storage Battery Co., Boston, Mass.
2375-306.—Globa Storage Battery Co., Graines, Moriage
Battery Co., Graines, Moriage
1800.—Storage Battery Co., Philadelphia, Dem.
1800.—Storage Battery Co., Schenectady, N. Y.
286-deluller-related Electric Co., Brookhin, Mass.
180-Wester Electric Co., Buston, Mass.
281-Wagner Electric Co., Buston, Mass.
286-deluller-related Electric Co., Buston, Mass.

The following were the exhibits of vehicles shown:



The Stand of the General Vehicle Company, Showing the Highway Transports and the Several Forms of Industrial Conveyers for Shops and Mills.

in quantities for the manufacture of the Edison batteries. All the machines utilized are built specially for the purposes used. Still another display by Thomas A. Edison, Inc., is worthy of attention, this including a "home kinetoscope," a new dise talking machine, a dictating machine and a primary battery, all of which have been practically developed by characteristic Edison energy and methods.

In the motor vehicle park there are 16 different exhibits of machines, with one in the basement, making a total of 17 when the show was opened. These displays are as follows:

Space Exhibitor Address
144-144—Anderson Electric Car Co., Detroit, Mich.
166—Atlantic Vehicle Company, New York, N. Y.
142-143—Ballicy & Co., Inc., S. H., Amesbury, Mass.

142-143—Balley & Co., Inc., S. E., Amesbury, Mass. 198-124-125—Balker Motor Vehicle Co., Cleveland, O. 155-156-161-162—Buffalo Electric Vehicle Co., Cleveland, O. 166-161—Century Electric Car Co., Detroit, Mich. one brougham and one 1000-pound delivery wagon, Atlanta Vehicle Company—One one-ion wagon chassis and one five-ion truck chassis.

balley & Company, Inc. S. R.—Three runabouts.
Baker Melor Vehicle Campany—One v.ccura, one brougasan.
Baker Melor Vehicle Campany—One v.ccura, one brougasan.
Brick Chassis, one general service wagon on a runabour vi-assis, one two-ton truck chassis and one two-ton truck with ex-

press body.

Buffalo Electric Vehicle Company—One runshout and two
coupes, one of the coupes being fitted with wire wheels.

Century Electric Car Company—One coupe and one broughsto.

Flanders Manufacturing Company—One colonial coup-General Motors Truck Company—One one-ton chassis that been driven 1500 miles in testing, ane three-ton truck with covered express body and one 15-passenger omnibus on a one-

(on chassis General Vehicle Cumpany—One 150-pound wagnn chassis, one electric erane track for industrial service, one cool truck tor the Boston Manufacturing Cumpany Rited with a dampin, bods, one two-ton wagon with covered body for the Pureoxia Company, one Weelon wagon chassis and one Weeton truck chassis

Lansden Electric Vehicle Company—Two 1008-pound delivery wagons with enclosed bodies and one one-ton wagon. Ohlo Electric Car Company—One culonial coupe. Rauch & Lang Parriage Company—One Insiducted and two

broughams

Studebaker Automobile Company—Two 1000-pound delivery wagons, one of which has been in the service of the Chilstian Science Monitor for three and a half years, and a three-ton truck with platform body.

Tyler Brothers Curporation-One runabout and two coupes and one brougham,

Underhill Company-One Grinsell coupe.

Walker Vehicle Company—One runaliout, one one-ton chassis, one two-ton chassis and one one-ton delivery wagon with enclosed body.

Waverley Company-time 750-pound delivery wagon and two coupes,

The Philadelphia Storage Battery Company made a very listeresting display of the Philadelphia thin plate batteries, which were shown to sectional form for the putpose of demonstrating the decrease of we glit and the increase of capacity by the use of these plates, and to show the construction of the cells.

The Electric Storage Hattery Company exhibited a number of the different types of butteries produced, these luchding bent thin and titlek plate cells, and for use in vehicle, lighting and ignition lutteries,

The Gould Storage Hattery Company made a show of the Gould batteries for both vehicle and lighting service.

The exhibition of the American Storage Britisty Company was of cells designed for finition and Highting purposes, principally for automobile service.

The Holtzer-Calast Company showed electric lighting and ignilion systems and devices for the regulation of electrical curcept. This ulsplay was very comprehensive more interesting.

The exhibits of the General Electric, Womer Electric Manulaturing, Western Electric and the Westinghouse Electric & Manufacturing companion were largely of devices for controlling and regulating electrical hostalisations, some of which were satisf for garage service.

In councetion with the 1912 Boston Electric Show the Electric Vehicle Chilo of Boston is constantly represented, it having an office in the garage in the basement, where representatives of the organization may be found and where all information pertaining to electric vehicles and electric vehicle transportation will be placed at the service of all inquirers.

The fourth annual convention of the New England Section of the National Electric Light Association will be held in Paul Revere Hall, in Mechanics' Building. October 15-17, with sessions at 10 in the morning and 2 in the afternoon of each day. The report of the officers and the address of President J. S. Whittaker of Portsmouth, N. H., will take place the opening session, and during the five succeeding sessions seven papers will be presented, the concluding one to be "Co-operation Between the Central Station and the Motor Manufacturer," by J. M. Tomb of the Westinghouse Electric & Manufacturing Company, Boston, Mass. The election of officers will take place the final session. The first evening the members will be entertained at a dancing party, the second evening they will visit the electrical show, and a banquet will conclude the convention

The third annual convention of the Electric Vehicle Association of America will take place at Paul Revere Hall October 8 and 9; the annual business meeting and the election of officers will take at the opening session. The meetings will be begun at 10 o'clock daily and one afternoon and one evening will be open that the delegates and guests may accept the invitation of the Boston Edison Company to attend the 1912 Boston Electric Show and participate in other entertainment arranged by the committee. The arrangements have been in charge of a committee of 36 headed by Chairman E. S. Mansfield. The following is the programme of the convention:

TUESHAY SESSION.

President's address-President C, E, Blood, Boston, Reports of committees.

Regular business and election of officers.

"Where We Stand Today"—C. E. Michel, Union Electric Light, and Power Company, 81, Louis, Mo.

and Power Company, St. Louis, Mo.
"Street and Traffic Conditions as Applied to the Use of Elec-

the Vehicles"-13. McAllister Lloyd, International Meter Conputs, New York, N. Y.

The Publicity Campaign of the Riccite Vehicle Association

of America"—Frank W. Smith, United Electric Light and Power Company, New York, N. Y.

"The West us a Field for Electric Vehicles"—Br. M.

"The West us a Field for Electric Vehicles"--ir M. Ekstromer, Benyer Gas and Electric Light Company, Denver, Col.
"Notes on the Cost of Motor Trucks"--ir, Hamid Pender

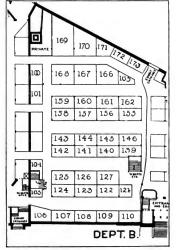


Diagram Showing the Location of the Exhibits in the Main Electric Vehicle Diaminy.

and H. F. Thomson, Massachusetts Institute of Technology, "Some Becent Developments in the Lead Battery"—Bruse Ford, Electric Storage Battery Company, Philadelphia, Penn.

WEDNESDAY SESSION.

"Electric Vehicle Development In the East"—Stephen J. Thompson, Public Service Electric Company, Newark, N. J. "Electric Vehicle Charging Apparatus"—II, E. Hussell, Gen-

eral Ricctric Company, Scienceally, N. Y. Theories of Commercial Cars in America, with Special Reference to the Electric"—E. S. Foljambe, Commercial Car Jour-

nal, Philadelphia, Penn. Paper by Westinghouse Company.

raper by Westinghouse Company.

"Insurance from the Standpoint of Electric Vehicles"—Carl

I. Clark, Field & Cowies, Insurance, Boston, Mass.

"The Eddson Storage Battery in Service"—H. II. Smith, Edison Storage Battery Company, Orange, N. J.

"Electric Vehicle Service"—I. C. Pord, National Electric

Lamp Association, Cleveland, O.

NEW YORK ELECTRICAL EXPOSITION.

THE sixth annual New York Electrical Exposition and Automobile Show will be opened in Grand Central Palace, 46th street and Lexington avenue, the evening of Oct. 9 and will be concluded the night of Oct. 19, covering a period of 10 days. The exhibition will be opened by Thomas A. Edison, who 30 years ago inaugurated the service of the world's first "central station" for the generation of electric current for distribution for commercial use. This event will be memorable because it will demonstrate the wonderful progress made in three decades. That first station, which Mr. Edison helped to build and equip, produced current for about 400 incandescent lamps, all within an area of less

than a half mile. which was not sufficient to light a single floor of a modern office building, This was the origin of the New York Edison s v s tem. which has always been the largest and finest in the world-the standard by which Europe and America measure the efficiency of illuminating service.

Where the first "central station" was established is now the site of a part of the mammoth twin structures used by the New York Edison Company as executive, adminis-

trative and maintenance headquarters, these buildings each covering a city block. The central station of the company now covers two blocks out the East river and from it current is sent out that furnishes light and power for the 62 square miles of area of Manhattan and the Bronx. The high-tension current is converted at 31 sub-stations to low voltage for the 129,000 customers of the company, and the lamps now number about 5,850,000, and with the current required for power there is daily generated what is equivalent to 11,500,000 lamps.

This wonderful progression will be demonstrated at the show by hundreds of exhibits that will interest every person. Electric energy, seemingly a dream of the man who will open the 1912 exhibition, has revolutionized the industries of the world and it is now as essential to industry and commerce, to the every phase of civilization, as the atmosphere itself. It has been said that when Edison placed in operation the Pearl street central station he made possible the modern city, which is but half the truth. Manufacturing, arts and sciences would never have been developed as they have been were it not for the incandescent lamp. Rapid transit would have still been dependent upon other forms of energy, and the great resources of the rivers and lakes would not have been developed as they now are to produce light, heat and power.

Despite the practical means for producing electricity its ntility would not have been realized had not the manufacturers of enrrent interested American ingenufty and demonstrated the possibilities. A score of years ago electric current was regarded as a commodity and was sold to those seeking it. Then Arthur Williams assumed the direction of marketing the sale of current. He realized the possibilities and began to educate the people to the use of electric energy. proving its economy, cleanliness,



Grand Central Paince, New York, N. Y., Where the Annual Electrical Exposition and Automobile Show Will Be Innururated Oct. 9.

convenience and comfort, and this work has given to the civilized people of the world a wonderful control of this intangible, invisible, yet marvelous force. From this beginning the present-day utilization of electricity has developed. In every phase of life electrical energy is today used with the greatest success.

The exhibition itself will be the largest and best ever seen in New York, and in addition it will have a department devoted to electric vehicles that will have quite as much interest to the visitors as any of the other displays. In this will be shown a considerable number of both pleasure and service machines, and these will be the products of some of the best known naunfacturers in the industry. While it may be said



The Main Floor of Grand Central Palace as Illuminated and Decorated for the Electrical Exhibition of Last Year.

that these are recognized productions it is also a fact that many of the vehicles are to be delivered to purchasers and represent the creations for genral and special service.

In all there will be about a third of the electric vehicle industry represented among the exhibitors, and besides these there will be a number of makers of batteries and in the general displays will be shown innumerable devices suited to the control and regulation of electricity and adapted to the equipment of machines and private and public garages. A decided feature will be made of the vehicle exhibits, which will be shown on the main or second floor of the building, and these will be both chassis and fully equipped machines. These stands will vary in size and some will show both the pleasure and service conveyances, as the two classes have not been separated. This, however, is not an occasion for criticism. As a matter of fact it is a condition that is to be commended in a show of this character, as opportunity is afforded to every visitor to examine the machines, and they form no inconsiderable part of the exhibition, when measured by space occupied and prominence through location,

On the upper floor of the section of the building devoted to the exhibition is to be the actual demonstration of pleasure vehicles. Here, as at the show of 1911, is to be the demonstration track, where those who are desirous of learning from personal experience the qualities of the machine when in operation may drive or he driven in cars of differing types. This track is to be 20 feet in width and a

single circuit is a tenth of a mile, so it will be seen that quite a number of vehicles may be demonstrated at one time. The track will be outlined by a boxwood hedge and back of it will be palms and shrubbery, and with the windows open there will be quite as much pleasure as when riding in the open air. Near the track will be four charging boards for re-energizing the batteries, so that there need be no cessation of demonstrations from exhaustion of the batteries.

The vehicle exhibitors have been asked to suggest features that will attract the visitors to the track and retain their interest. Mrs. Alice E. Waxham, who is well known as an expert driver of electric machines, will serve as an instructor for the ladies who desire driving knowledge. The instruction will first be given with a car mounted on what may be termed a



flow the Vehicles Are Utilised for Exhibition and Demonstration Purposes, and Are Luter Shown in Mution on a Track.



Acthur Williams, President of the New York Electrical Exposition and Automobile Show, and President of the New York Electric Vehicle Association.

"tread mill," so that the car will be actually operated, though motionless, and the pupil can practically obtain knowledge of operating the control levers, the brakes, starting, stopping, reversing and other essential detail until confidence is established. The next lesson will be in driving on the track under the supervision of the instructor, and the third will include driving the ear on an elevator and taking it to the street, where experience will be in differing degrees of traffic.

The track, the demonstrations, and the work of the vehicles will be directed by the New York Elbertic Vehicle Association. This organization has carefully systematized the practical showing of the vehicles, and it is expected that there will be a very large measure of success. Of course the show will be a centre for those who are studying and investigating transportation problems and the association will have available all facts that may be valuable to inquirers.

Besides the road vehicles there will be shown differing forms of industrial trucks that may be utilized in shops and mills, and which have been devised with a view of obtaining the same economy of work in the handling of materials and stock in different stages of production.

The exhibitors of electric vehicles will include the following:

Space	Exhibitor	Address
6 86	Atlanta Vehicle Company	New York, N. Y.
9	Anderson Electric Car Company	Detroit, Mich.
10-31	Baker Motor Vehicle Company	Cleveland, O.
-6	Balley & Company, Inc., S. R.	Amesbury, Mass
7-59-61	Buffalo Electric Vehicle Co.	Buffalo, N. Y.
16	Champion Electric Vehicle Co.	Oswego, N. Y
4	Cleveland-Gallon Company	
2-63	General Motors Truck Company	Delroit, Mich.
5-46	General Vehicle Company	L. I. City, N. Y.
4-35	Lansden Company	Newark, N. J.
2 - 53	Studebaker Automobile Co.	South Bend, Ind.
	Ward Motor Vehicle Company	New York, N. Y.

These concerns will make display of vehicle, lighting and ignition batteries, and processes entering into their manufacture:

Space	Exhibitor	Address
77	Edison Storage Battery t'o.	Orange, N. Y.
58-60	Electric Storage Battery Co.	Philadelphia, Pa.
40	Gould Storage Battery Co.	New York, N. Y.
74	Philadelphia Storage Battery Co.	Philadelphia, Pa.

The attractions in the other departments of the show will be of great interest and these will include the exhibits bouned by the United States War, Navy, Commerce and Labor and Agriculture departments, and the Bureau of Mines. Besides there will be demorstrations of uses for electricity in manufacturing, science, arts, household and domestic service, office and labor saving devices, sick room supplies, hospital appliances, refrigerating, ice-making, automatic codeing, water heating, hotel equipment and for all manner of signs and movelties.



A Section of the Main Ploor of the Grand Central Pulace, Where the Main Display of Pleasure and Service Vehicles Will Re-Seen.

CENTRAL STATION PUBLIC GARAGE.

Hartford, Conn., Electric Light Company Promotes Vehicle Use by Practical Methods and Has Inaugurated a System of Battery Service on a Mileage Rental Basis

That Eliminates Maintenance and Attention by the Owner.

THE Hartford, Conn., Electric Light Company is engaged in the promotion of the use of the electric vehicle in urban delivery service because the management of the corporation believes that the development of this form of transportation offers very large opportunities for the sale of current during the offpeak period of the day, and it is confident that with reasonable use this form of mechanical vehicle is very economical. The example of this company can profitably be made the subject of study and investigation by every other public service station in America, and there are well nigh 30,000 companies now selling light and power. In this promotive work the company has been especially energetic, and not only does it furnish light and power and current for charging, but it ura intaius a

public garage for electric vehicles, it specializes the m a intenance and restoration of all forms of vehicle and lighting and ignition batteries. and in addition it is the agent for Hartford and vicinity for General Vehicle wagons and trucks.

Not only this, the company has just announced a new policy in selfing battery service, in which the customer is assured practically an inflimited use of batteries, he paying an initial charge for the privilege and a mileage rate for the number of miles that his vehicle or vehicles are driven by the batteries, always having at his disposal a freshly charged battery, and making as many changes as the requirements of his business neces-

This in brief outlines the business the company desires and what it has undertaken, going to what may be regarded as extremes by those who have less enthusiasm and optimism, and yet this policy is founded on what may be considered to be mature experience and ample knowledge of the electric vehicle market. From the standpoint of the company, however, there is every reason why it should stimulate the use of electric current, and with abundant confidence in electrically driven wagons or trucks it is prepared to exploit their use as it promotes the utilization of electricity for any other purpose.

When the Electric Vehicle Company began to produce electric pleasure machines in Hartford the attention of Hartford people was naturally directed toward them because of obvious reasons, and President H. C. Dunham of the Hartford Electric Light Conpany became interested from the fact that his company was required to provide current for charging those owned by residents of the city. Eventually a Mark XII runabout, a vehicle with a 40-cell battery, was purchased, and this was used by the officers of the company and it served to demonstrate the utility

of the machine,, as well as giving the officials some especially desirable experience in battery maintenance and attention. The runabout was delivered early in 1899. and while it was a very s a t i sfactory vehicle at the time, it was heavy and slow when c o n trasted





The New Public Service Station of the Bartford Electric Light Company in Main Street.

with the machines of today, and the workmanship and the design was crude when comparison is made with present day design. 6.

At that time electric vehicles were practical, but there were lacking many of the qualities which have been developed with experience and incorporated in the machines of modern type, for 12 years is a long time when measured by progression of electrical engineering. After experience with the runabout for a short time the company purchased its first service wagon, this being a ton Riker, and later on added another wagon of the same size and make. Both of these were placed in general hantage and gave excellent satisfaction, and in 1900 the company was delivered a two-ton Riker wagon. From time to time three other Mark XII Columbia runabouts were purchased from the Electric Vehicle Company, and by 1901 the



Main Piper of the New Main Street Station of the Hartford Ricctric Light Company.

four runabouts and the three wagons were in constant use. The runabouts were used by four officers of the company in the transaction of business, and the wagons were utilized for haulage and construction. Within a comparatively short time a 1500-pound Riker panel body wagon was added, and in 1902 a Waverley machine was placed in service, but the latter was used but a comparatively short time.

With this service of eight or nine electric vehicles a considerable part of the work was done without animals, and about this time the company engaged in the production of the Barhoff storage battery, a secondary battery that is stated to pussess peculiar qualities, and while these were not built commercially they.

were used for a number of years, and some are now in use. These batteries were claimed to have remarkable qualities of endurance, and considerable attention was given to experimentation and development. While the battery building was not with a view of specialization in battery attention and maintenance there is no doubt that the experience gained has proven to be of decided value to the company.

In 1903 the company bought three more small Riker electric wagons, two of which were used for mail transportation during the progress of the Buffalo Exposition, and were later brought to Hartford and were used in the service of the company. Several changes were made from time to time and an average



Interior of the Garage at the Pearl Street Station, to fie Used Exclusively for the Service Vehicles of the Hartford Electric

age of about 10 machines were in use until 1905 or 1906. It was necessary for the company to establish a garage for the care of its own equipment, and this was first at the State street station, where the batteries were built and the equipment was installed for the charging of the batteries. This led to the creation of a battery department, which has been for more than 10 years in charge of W. M. Thaver, who also directs the transportation of the company. In 1903 a Columbia wagon was installed and used in construction work, and later on the original Columbia runabouts were replaced by more modern machines, there being now four of these vehicles in use. Though not as fast and much heavier than the later productions these Columbias have given a large measure of satisfaction, being used for differing purposes.

The lines of the company extend in a radius of from 12 to 15 miles from Hartford, there being stations at bus of the Hotel Hueblein was also kept there, the vehicle being supplied with the Barboff batteries when renewals were necessary. The original batteries were with the thin Manchester form of positive plate and the chloride negative plate, made by the Electric Storage Batters Company.

From 1905 to about 1910 the company did not add to its electric vehicles, working those it owned, but using gasoline machines for the lighter work and employing the Riker wagons for the haulage. It was not until November, 1910, that it delivered the first General Vehicle wagon to the Boston Branch Grocery, a concern that had in its service 25 or more horses and had used animal delivery exclusively until that time. The officials of the company decided that it would be well to promote the sale of electric vehicles and as the agent for the General Vehicle Company engaged actively in a selling campaign, this being under the di-



Section of the Main Floor of the Klusley Street Garage of the Hartford Electric Light Company, Soon to Be Utilised for Other Paranage.

Tariffville, Windsor, East Hartford, West Hartford and Wethersfield, as well as the local plants, and lines for power run to Dividend and to South Manchester. The company has two water power stations, the remainder being steam. Both power and lighting require attention to all these lines and at all hours of the day and night. The peak load is about 4:50 in the afternoon. Covering the area that it does the demands of the company necessitate the use of a considerable number of vehicles for differing construction and maintenance service. The garage was equipped with charging panels and the facilities for caring for the machines, and for a considerable period much of the repairing was done by the workmen. In this garage the city of Hartford's Columbia ambulance and police patrol wagons were kept so long as they were in service. From 1901 to 1907 the Columbia electric omni-

rection of Mr. Thayer. Incidentally this sale to this company has been followed by orders for eight more of the same type, four of which are yet to be delivered. and this concern has also a 1000-pound Detroit delivery wagon and a 3000-pound Waverley wagon, the latter being used for hauling freight to and from Warehouse Point. It was the sale of these machines that formulated the policy of the company to establish a public garage, for its customers and others owning electric vehicles demanded a station where they could receive a satisfactory service, not being willing to accept the facilities of other public stations as sufficient for their requirements. In other words they did not care to be dependent upon pleasure car garages when business necessities compelled their machines being serviceable at all times.

First a building that had been utilized for a boiler

house at the Pearl street station was equipped as a garage, and at this was maintained all of the machines owned by the company, and this left the Kinsley street (or the State street) station garage open for the use of the owners of electric wagons and trucks who desired a public service. The Pearl street garage is limited by floor space to about 20 vehicles. The charging board is located in a gallery. Naturally, its equipment is excellent.

The battery department at the Kinsley street garage, which was also finely equipped, was given over to work on all batteries, and in connection with this a renting system was established so that automobile owners may obtain for a stated sum paid weekly either an ignition or a lighting battery, having the privilege of returning an exhausted battery and obtaining one completely charged as often as desired. That is, for the subscription price the service is guaranteed for used for construction work and one of the small machines is used as a lamp wagon and as a trouble wagon. In addition to these six gasoline runabouts are employed, all of them small machines.

This season the company decided to crect a public service station and it built a fine brick building, a portion of it two stories, with brick floors, conveniently located off Main street, which has a capacity of 20 machines, but there is ground area available so that the building may be increased to have a capacity for 100 should the need develop. This garage is not as yet used, but when the charging board is installed it will be opened and in the course of a month it will be ready for the accommodation of patrons. It will have a combination charging board of 12 panels and every modern facility. Then the Kinsley street garage will be devoted to battery work and caring for demands in excess of the facilities at the Main street station.



Battery Boom of the Hartford Electric Light Company at the State Street Station, Where Batteries of All Kinds Are Given

whatever form of battery is required. In connection with this department, the outgrowth of the battery building division, vehicle batteries were given attention, maintained and charged.

The company took delivery of its first General Vehicle wagons June 10, 1910, these being two 2000pound and one 1000-pound wagons. Just previous to
this time the company was using two of the Riker
wagons, these having been in service since 1900. One of
the Riker wagons was retained, this being a two-ton
machine, and since that time two more 2000-pound,
one 1000-pound and two 750-pound wagons have been
added to the equipment, all of the G. V. make, and
two 1000-pound Detroit wagons have been bought.
Besides these the company is still using the two-ton
Riker wagon, for which a new battery has just been
or fered, and three of the Columbia runabouts, making
a total of 14 electric vehicles. The large wagons are

The company has contracted for a number of Edison batteries and it is proposed to sell wagons and trucks without batteries, the customer to pay an initial or service charge, and then to have the use of a battery whenever it is needed, there being a mileage rate established so that the customer need give no thought to battery maintenance or expense. The company will receive a rental for the battery and it will supply the current, and as frequently as desired the battery may be changed. If the customer uses batteries constantly so much the better, but with this system there must be reasonable use, as the company cannot contract to furnish occasional service. Special equipment will be installed for the shifting of batteries quickly. There is a demand for this service, which was developed last winter when a customer with an electric wagon averaged from 65 to 75 miles daily through the winter, on one occasion reaching a mile-

0	REPAIRMANS REPORT
	IF NOT REPAIRED STATE WET AND GIVE STOCK WANTED
	BATTERY CHARGED ON FILLED GIVE NO
0	THIS CAR IS O IZ TO GO OUT IN WORMING
	DRIVERS DAILY REPORT
)	Det
	Out Corbin
	MARE I AFTER ANT PART BUT WORKING PERFECTLY
	Balley Bell Bridge Std Class How Con-
	Contribution Lights Malor Stories Working
)	Bridge Company

Driver's Delly Report, Made in Dapilience an Lower Blank, the Copy Baving as a Upper Blank on the Reverse. Original Copy Baving as Apper Blank on the Reverse. Original Makes Repair, or Reports Why. Repair Cannot Re Made. Printed on White Paper, 8.3 Inches Width and 4.5 Inches Length, Perforated for Loose Lengt Blading.

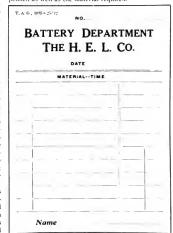
age of 78. With the battery changing plan the more the vehicles are used the cheaper becomes the rate for current, which is charged for usually at the rate of four cents a kilowatt-hour. In connection with this service the battery department will give attention to all classes of acid batteries and will maintain them as the customers may desire. The exchange system, however, will apply only to the Edison batteries.

The company has given the garage problem much study and attention and would prefer that the customers would have their vehicles washed, oiled and greased by their own men, because it has up to the present time charged a flat rate for monthly garaging. to which it added the cost of the current used. This rate provides for washing, polishing, greasing, oiling and the care of the batteries, as well as minor adjustments. Inspection is also given the machines when requested, this being a service satisfying the customers and insuring to them a better degree of utility. As the garage has been over-crowded for a considerable period, there being about 25 machines under supervision, work has been done under conditions that are decidedly a handicap. It is believed, however, that some of the customers will eventually establish their own garages, which will afford a relief.

In the sale of the electric machines great care is taken to insure figures that will be practical and conservative. Usually a delivery service is investigated and after study a demonstrator is set at work and from the figures obtained from actual work the prospect is given information that is decidedly reliable and based on the requirements of the business. This entails close examination of the factors entering into the particular case under consideration, and the inquirer obtains facts that are often surprising, for unusual reasons for waste and some peculiar conditions that should be changed for greater economy are occasionally disclosed.

The sales department of the company is always at the disposal of those who are desirons of improving their own service. The belief is that no conditions are alike and it would be injudicious to attempt to base an estimate for work or cost on the experience of another. Carrying out this idea the desire is to advise the probable customer where it is possible and how it is practical to use electric vehicles and with the largest economy that is evidenced by the demonstrations.

The system of the public garage is simple and is said to be exceedingly satisfactory. As stated there is a flat rate charged for the service, to which is added the cost of the current used, as well as the labor and material in making any repair. When a wagon or truck is garaged on a monthly basis it is not tagged for identification, but is identified by the owner's name in the garage, while it is carried on the garage records by the registration number as well as the name of the owner. Each vehicle receiving attention is given an envelope which carries a serial number, and into this envelope is placed every charge that is made against the machine for the month, this including the labor expended as well as the material required.



Fine and Material Record of Repuls Shop of the Hartford Electric Light Company, Pilled in by Workman, Printed on White Paper, Five Inches Length and Three Inches Width.

	ENTERED MAIN JOURNAL POLIO		BATTERY DEPARTMENT Date Received from										
	TRENS	Locati			Via			Laugas Por					
the second	STOCK CLEPK	QUANTITY		ATERIAL	Peace	AMOUNT	TOTAL	TOTAL CP.					
		WORK	ORDEREC										
			DELIVERED										
_			DELIVERED					-					

Original Billing Record of Hartford Electric Light Company, on Which Items Are I barged Daily, Printed on White Paper

Under ordinary conditions there might be no charge, other than the record of the current used, which is obtained daily from the charging sheet, and at the end of the month the customer's envelope is filed in the serial order, where it may be referred to quickly at any time. In the event of material being needed and time required for a repair, this is first brought to the attention of the garage by the daily report of the driver. This report is made in duplicate and after specifying the date, the name and make of the machine, each assembly in which trouble might develop is named, followed by a blank in which a check mark or cross is made. The sheet is then signed by the driver. The original report goes to the owner, and this is a check on any fault developed. The copy of the report, made in carbon, is delivered to the foreman of the garage. On the reverse of this copy is the "Repairmais Report," and this must be filled in by the foreman, specifying what disposition was made with reference to the fault reported, whether or not it was repaired, or why no repair was made if the machine is not ready for service. As it is the purpose of the garage to keep the wagons in condition for use it is only an unusual fault that cannot be given immediate attention. This report indicates the work performed on the machine, and if material is required in the preformed on the machine, and if material is required.

LABOR	BOR			COST			DESCRIPTION	
	HOUNE	RATE	400 110	guartete	MATERIAL	PRICE	AMBURT	
_								
_								
				-				
_								BATTERY TEST
								BATTERY TEST
								BATTERY TEST
								BATTERY TEST

Reverse of Original Billing Record, Showing the Items of Labor and Material, with Description for Future Comparison and Result of Battery Testing.

it is noted and requisitioned by the foreman.

On the time and material card, which is given a serial number, is stated the material requisitioned, and the labor required for the work, and as each employee must account for each minute of time to be paid for his work, each card is returned to the foreman, signed by the workman, with the completion of the job, and not until one work is completed can another be undertaken without the permission and approval of the foreman. If the work is on a battery a card is filled in with the name of the owner and the number of the wagon. This card is divided into three sections with perforations for separation. One section is attached to the battery, another is posted on a board to account for the battery itself, and the third goes to the customer's envelope. With record of the time and material the prices are entered in the office, and with the battry card the charges are posted to a loose leaf record.

The charging record of the company is made on large sheets and each is ruled in columns for the charging lines, and cross-ruled for 39 entries with reference to time, so that each period may be accounted for during the 24 hours of the day. The record is very closely kept and the readings are made by hour or half-hour periods. In the charging the machines are identified by the registration numbers.

The system of the company has been developed with long experience and works out to the entire satisfaction of the officials. It may be possible that there will be supplementary record made with the opining of the new garage, but this is not as yet believed to be necessary.

The Hecker-Jones-Jewell Milling Company, New York City, recently took delivery of its third Sampson truck, made by the Alden Sampson Manufacturing

	IARGE.	40 Cal		8	13 Amp	10 to		112 Vo 112 112 113 52 104		Ha	rtf	or			ecte			ng				mp	oar	13
	LINE			N. 2	LIN	No 3	LINE			E.N. S		No 6	LINE	No. 7	LINE			. N. 9		No. 10		No. 11	LINE	
	Car	Rep.	108	-	108	43-	544	7	54	40		VZ	950	7	54	50	9 7	4.8	92	6.4	120	2.79	143	
11/44	10/14	1,917	10121	6,967	210.50	LWP	100.76	AMP	VOR 25	AME	111 24	146	TOUTS	AMP	114 Is	AMP	1/010	1.65	10119	1307	VIH 25	AMP	40014	AM
8 A.M																								
# NO									_															
10																								
Lt.																								
IZ NOON																								
1 P.M																								
Yall Sales & Cop. Malas & Cop																								
			-	_	-		-	_	-		-	_	_	_	_	_	_		_	_		_		_
W H Chi																								

Section of Vehicle Charging Record of the Hartford Electric Light Company, Having Space in Width for 18 Linea and Remarks, and Leagth for 39 Entries by Time Periods, Each Line Being a Record for One or More Vehicles, with Emential Details—Printed on White Paper 225 inches Width and 15.5 Inches Leagth.

This record identifies the job, states when the work was received and when it was promised for delivery, and the items of material and labor are entered on the reverse of this record sheet, together with a description of the work and whatever data are desirable, and a statement relative to the test or tests made with the battery. These records are kept in two binders, that of the unfinished work being known as the "live book," and the other of finished work being known as the "dead book," As the records are indexed, reference to them can be made instantly. When the work has been completed the requisitions are checked back and this insures against error and makes certain the correctness of the charges. Copies of the record sheets are made and sent to the office of the company, where the cost and the selling price are extended and entered in the bills rendered to the customers.

Company, Detroit, this being the second repeat order in less than a year. Novel methods of emphasizing the success and economy in the use of motor trucks were adopted by the purchaser when 12 horses and six men, supplanted by the new vehicle, were paraded behind it through the business section.

A 22-passenger KisselKar, made by the Kissel Motor Car Company, Hartford, Wis., was recently purchased for use between the Northwestern Railroad station at Highland Park, Ill., and the Exmoor Country Club. Round trips are made every hour. The roads are smooth, but very hilly, although the ear takes all the hills on high speed. The vehicle is doing such good service that it is the object of much favorable comment in that section of the country.

ELECTRIC VEHICLES IN COAL HAULAGE.

OAL is one of the necessities of life and the consumption is increasing annually. It is indispensable and there is no satisfactory substitute. It must be supplied in varying quantities and when required. The demand is somewhat governed by circumstances and conditions, but the distribution is dependent mon needs of the consumers. That is, each distributor endeavors to provide for his regular customers and to do whatever additional business he can, and the volume of sales depends upon his ability to make delivery for the prices that have been fixed by common consent.

To illustrate, there is a vard price for different grades of coal, and it is customary to charge a small sum additional for each ton when delivered within certain specified zones, usually one, two, three, four or five miles, and to make special rates for deliveries to

Cousens Conl Company's Conple-tierr Four-Wheel Drive Truck Hauling a Load of Five Tons from the Porkets.

longer distances. The prices ordinarily apply when the coal is delivered at manholes, chutes or bins on the ground floor or basement, and if the order is carried up one or more flights of stairs there are charges made for this service proportionate to the labor,

Now it will be apparent that these prices are nothing more than approximations and do not by any means represent the actual cost of delivery. The same charge is made for hanling a ton of coal 300 yards as for a mile, and for handing a corresponding excess of a smele mile as for two miles, and so on. It is also clear that at least a half of the mileage is improductive, and because of varying conditions not all the loads are to capacity, so it would seem that about 40 per cent, of the total is all that can be regarded as being pay mileage, that is, if the capacities of the vehicles are considered as the basis.

The variance in the length of the hauls brings about this condition. A charge of 25 cents a ton delivery for a quarter mile would be profitable, but to carry each ton a mile for that price would probably yield but little, if any, profit, for the load would be carried the full distance and the empty vehicle returned, making practically four times the handage for the same charge as for the short hand. But as the service is based on average and not on actual cost, as each dealer is brought into competition with others who may be able through location to make a lower price for delivery and as the cost of harlage is constantly increasing, business reasons innel the maintenance of the rates for hauling. which is only possible through economy.

Coal haulage economy has been given careful attention for a comparatively brief period. For years

horse vehicles were used without a thought as to the expense, as these were the only forms of transports available. While it is probable large enterorises found it cheaper to own and operate their own delivery equipment, it is also a fact that service is variable and what would be adequate at different periods of the year would be decidedly inadequate at others, in which event horses, carts and drivers were hired to meet any requirement. Some concerns having large delivery equipment found it profitable to allow other firms to use them during the season when the business was dull and in return received the use of the horses not required by the borrowing firm when there was a corresponding season of inactivity. But the fact re-

mained, and this condition has been little changed, that delivery expense was not accounted and was regarded as an operating cost of practically unknown proportions

Economy has always been a result of investigation that disclosed waste of time and money. The larger the business the greater has been the attention given to detail and record, and with the coal companies that were required to hanl thousands of tons annually the possibilities were understood when motor vehicle transportation was promoted. It was not until within three or four years that experiments were begun with mechanical transports in coal delivery, and while there were probably isolated instances antedating these, as a matter of fact economy could not be determined because of the lack of reliable data.

It is probably not known that the largest number

of electric vehicle used in coal haulage are in daily like business. The first vehicle installed was a fourservice in Boston, the first being utilized rather more

wheel driven Couple-Gear truck, as it was believed the than two years, and these have been found to be so character of haulage was such as would require abun-



Consens Can't Company's Pour-Wheel Drive Track Hanting a Wagon with a Three-Ton Load as a Trailer.

satisfactory that the firms owning them have added constantly to their equipments. There are now no less than nine concerns having a total of 16 electric machines, and eight others are now being built for them, which will make a total of 24 when these have been placed in service.

The equipment in use is of three makes, one being the Couple-Gear Freight-Wheel Company's four-wheel driven trucks, the second the Eldridge front-drive carts, and the third the General Vehicle Company's trucks. The service in each case is variable. With some the service is confined to what may be regarded as short hands, being the cartage of capacity loads to buildings and plants where considerable quantities of coal are consumed daily. In other instances the transportation is longer distances with capacity loads, and there are the occasional trips and the family trade. where deliveries are made of

supplies for considerable periods. There are also several firms that employ the machines to haul coal and ashes, the requirements of their plants being such as to justify this class of cartage because of the economy realized.

The first machine to be placed in service was installed by the L. N. Cousens Coul-Company at Brookline, a concern that has a large business and whose customers frequently require considerable quantities, these including residences, apartment houses and manufacturing concerns. Prior

to July, 1910, all of the work was performed by horses, and the service did not differ materially from that of any other firm doing a dant power, and the thought was to utilize trailers when possible, this increasing the capacity of the outfit to 10 tons. When first delivered it was necessary to use an improvised body for a short time. but later it was equipped with a dumping installation, Brookline and Newton, where most of the lusiness is done, are largely residential sections, and some of the streets and roadways used are exceedingly hilly. The purpose was to use the machine for long hauls so far as possible and to make short hands when not other-

wise employed, utilizing it to the best advantage. The company wanted to get the largest service

possible out of the machine and wherever possible a trailer, which was an ordinary wagon or eart, was hitched to it and the combined load hanled and delivered at practically the same speed as without the trailer. The cost was but little more than when the truck was used independently, and the saving was decidedly large as contrasted with any other form of delivery. The truck was worked through the first winter with decided satisfaction and in March, 1911, the Metropolitan Coal Company of Boston, one of the largest, if not the largest, coal companies in New England, after observation of the Cousens truck, made order for a truck of exactly the same specifications, this to be used for the delivery of coal in Boston and vicinity, but chiefly in long hauls.



Four-Wheel Drive Truck and a Wagon i sed as a Trailer in Making Delivery of Excess

In June, 1911, the second truck was delivered to the Cousens Coal Company, and this was practically the same as the first and it was intended that it should be

used in the regular banlage with trailers wherever this was possible. The year of experience with the first machine demonstrated that the trucks could be worked constantly if desired, and that it was merely a matter of utilizing them. Then the company leased an abandoned roundhouse near the Cottage Farms bridge. Commonwealth avenue, from the Boston & Albany Railroad Company and used it as a garage. In this was installed a 5-50 ampere mercury are rectifier, and the batteries were charged from an alternating current. Two batteries were provided for each machine and these were changed at noon each day. This necessitated charging day and night, and with this coninment the trucks were insured practically double the daily mileage if necessary. As a rule the machines were driven about 35 miles daily, hanling from 20 to 25 tons on long hands and from 30 to 40 tons on short hands, where the coal is delivered without nunsual delay. For large orders trailers are used, and then the capacity is materially increased. It should be stated is needed to restore that lost through evaporation, and there is a contract with the agent for the truck that when the batteries fall below 90 per cent, efficiency the battery plates are renewed. Up to now the trucks have each given practically the same service that could be expected from three double horse teams, and it is estimated that the cost of operation is \$12.84 a day.

This expense is itemized as follows: Operator, \$2.50; current, \$1.60; tires, \$2.35; batteries, \$2.67; new parts and repairs, 50 cents; depreciation at 10 per cent., \$1.33; fire insurance, 40 cents; liability insurance, 32 cents; floor space at \$50 a year, 17 cents; supervision, 50 cents; interest at 5 per cent., 50 cents. At a mileage of 40 daily and with five-too loads this gives 100 ton-miles, the cost being 12.8 cents a ton-mile.

The Metropolitan Coal Company used its first truck until January, 1912, when it ordered its second machine, this being an Eldridge cart. This is an entirely different vehicle, it being an equipment where the forward or motor section is carried on the front wheel-

and about 90 per cent, of the load is carried on the rear wheels, which are equipped with steel tires.

The front wheels are the Couple-Gear patent and are driven by motors within them, the battery being carried under the driver's seat. The forward part of the running gear is attached to the front wheels and the body is of a dumping type, having a capacity of five tons. These machines have been termed "Philadelphia dump carts," and when a platform or truck body replaces the dumping body it is known as a "Boston caravan." Having but half the motor bower of the four

the motor power of the fourfleedy. The first hard in the somewhat slower as to speed, but have the same carrying capacity. This cart was an experiment and was worked with the animal service, doing what may have been regarded as the shorter of the long hauls, also

practically any work that was required in delivery. The work performed by this cart was exceedingly satisfactory, and while each machine is built to order and time is required for delivery, a third cart was delivered in May of this year, a fourth in July, a fifth in September and two more are to be placed in service as quickly as they can be produced. When these orders have been filled the company will have a four-wheel drive Couple-Gear truck and six Eldridge carts in its service. Until recently these machines were kept at the Atlantic Avenue garage and were maintained by the service at that station, but the company has constructed a garage on one of its only piers at the foot of Summer street, where it will in future keep its machines. The building is of wood, a single story, with



Five-Ton Eldridge Front-Wheel Drive Tip Cart, the First Machine of the Kind in the World to He Equipped with Electric Holsting Body.

that pending the regular installation in the roundhouse the batteries are being charged with a motor generator. The success with this truck was such that another was ordered and was delivered in August of this year, and two more have been ordered for delivery as early as possible.

With each truck an additional battery has been ordered and this will give the company practically the
same as 10 trucks when each battery is utilized to its
capacity, to say nothing of the additional haulage with
trailers. Practically all the extra equipment provided
has been a spare wheel, which may be used on any of
the trucks if necessary. All of the work about the garage is done by one man, who also cares for two automobiles that are used by the officials of the company.
The attention is confined to lubrication and adjustments and from time to time it will be necessary to
replace worn parts. So far as the batteries are concerned they are simply given whatever distilled water

a series of wide doors in the front, so that each vehicle may be backed into its bay and may be driven out without utilizing any of the floor space, all the turning



One of the Fleet of Eldridge Front-Wheel Drives, Capacity Five Tons, in the Service of the Metropolitan Cont Company, Boston, Mans.

being done outside the building. The structure is well built, has a fine concrete floor, and it is constructed with a view of expansion.

In the service of the company these vehicles have given a maximum speed of six miles an hour and a daily mileage of from 25 to 30, according to the work, hauling five tons, but where the streets and roads are rough and hilly it is probable that this would be reduced somewhat, for the purpose of the cart is primarily economy. It is safe to place the average mileage at 25, and this gives about 62.5 ton-miles. The cost of operating carts of this character has been placed as follows, this being what is believed to be a fair approximation: At owner's plant- Driver, \$2.50; current at two cents a kilowatt-honr, 76 cents; tires, one set a year, 90 cents; batteries, one renewal a year, \$1.17; new parts and repairs, 33 cents; depreciation, 10 per eent, less batteries and tires, 94 cents; fire insurance, 25 cents; liability insurance, 32 cents; interest at 5 per cent, on averaged investment, 32 cents; floor space, \$50 a year, 17 cents; supervision, 50 cents; total, \$8.16. At the garage the cost is placed somewhat in excess of these figures, the estimate being as follows: Driver, \$2.50; current, \$2.80; with the other items the same, without a charge for floor space or supervision, the total being \$9.53.

It will be understood that these estimates are made from the results actually obtained in daily service in Boston and vicinity, and are conservative. With the cost as given at the garage of the owner the cost per ton-mile is placed at 13 cents, and at the public service station 15.2 cents. With relation to the carts they have been worked constantly since delivery, some of them through the severest winter weather, there being comparatively little reduction in average service because of the highway conditions. The Metropolitan Coal Company has equipped its garage with a 50 horsepower 30 kilowatt generator and the intention is to give long, slow charges. The company has provided a stock of the parts that may be expected to wear and it has a spare wheel for emergencies, and all

of the attention to the machines is to be given by the mechanic who is on duty nights. It is stated that this is the only electric garage maintained by a coal dealer.

One of the most interesting installations is that of the Oniney Market Cold Storage and Warehouse Company, which is believed to be the largest cold storage plant in the world. The company has two plants, 2000 feet apart, the one being at the water front and the other in the business section of the city. The company receives its coal at the pier and it is necessary to hanl the supply needed for the inland station. This was formerly done by horses. In giving the order for this cart it was specified that the body should be automatically hoisted and lowered, and it was built with an electric hoist which is said to be in every way efficient. This was the first electrically hoisted tip cart ever built, and so far as known it has not been duplicated. Thirty tons of coal are required each day at the inland plant, and each morning the cart is engaged in hauling this quantity from the pier, and in the afternoon ashes are hanled from the warehouse, whatever spare time the driver has being devoted to general haulage. The company makes its own current and charges the battery, having one charging panel for equipment, and in the 11 months it has been in use nothing has been spent aside from the wages of the driver but for current and \$20 for spare parts that it was believed desirable to have on hand. Since it was placed in service the company has never required the use of animal vehicles for the work it was bought to do.

In December, 1911, the Edison Electric Illiminating Company of Boston took delivery of a five-ton cart
which was placed in service hauling ashes from the L.
street station of the company to a dump, the work required of it being to haudle a cubic yard of ashes an
hour. The cart has been in use daily since that time
with excellent satisfaction, and has been unusually
coronnical, for it is kept at the Stanloge street garage of the company, where it is charged and maintained to the standard of efficiency for which the company's equipment is noted;

In June of this year the Locke Coal Company, Mal-



New Electric Cart Garage of the Metropollian Coal Company at Its Wharf Pockets.

ilen, Massa, was delivered a five-ton cart which was placed in the delivery service of the concern. This machine was garaged on the premises of the company and the current is supplied at present through a mercury arc rectifier with current taken from the lines of the Malden Electric Light Company. Shortly after



One of the Carts with Eldridge Front-Wheel Drive Operated by the Locke Coal Company, Boston, Mass.

the cart was set at work a second machine was ordered, and an order was given for a three-ton Wright hoisting body, which will be used in the hadage of lime, cement and building material. The company has built a garage on hand next to its wharf, where the machines will be kept, and the attention will be by the mechanic on duty at night. The cart now in use and its driver are doing the work of two two-horse teams. The average work is practically the same as has been realized by the Metropolitian Coal Company.

The Staples Coal Company received its first fiveton eart in July of this year and this was garaged at the Atlantic Avenne garage, where it is now given attention, but the plan of the company is to eventually garage its own vehicles and to give them the same character of attention that is provided by the other firms that have been mentioned. This concern has ordered two more of the carts and these are to be delivered as quickly as they can be produced.

The Hunt-Spiller Manufacturing Corporation, located in Dorchester avenue, South Boston, maker of heavy castings, has one four-wheel drive truck with a dumping body, which it utilizes with two batteries. this giving it practically double the mileage. The cart is used for hauling coal, coke and molding sand to the foundry and for removing ashes and slag, as well as hauling pig iron and castings. This cartage is heavy and the loads are variable, but the truck has given the best of service since it was installed in February. 1911. The machine is giving about the same mileage and at the same expense as are the trucks of the Cousens and the Metropolitan companies, and it has been worked constantly. The company makes its own current with a crude oil engine that is also used for other purposes, and a generator, and it will continue this when the five-ton cart that has been ordered has been delivered. This cart will be itsed for much the same form of haulage as the machine now in use, but the speed will be somewhat less.

Three other firms have ordered earts of five-ton capacity, one of these being the Wellington-Wild Coal Company of Cambridge, Mass., but this particular order will utilize the body and renning gear of a cart used with three horses. This outfit will be fitted with a Keystone hoist and it will be utilized for the delivery of coal. The business zone of the company is within a radius of perhaps five miles, and the cart will have a capacity of 30 miles a day with five-ton loads and on reasonably good highways. This company will buy its own current and use a charging panel in its garage. The other two orders are to go to Providence, R. L. the one to the Seaconnet Coal Company, and will be used for the short haul deliveries for which animal earts are now employed. The company has a garage at its pockets in Allen avenue and it will use current supplied by the Narragansett Electric Lighting Company. The second Providence order is for the Brown & Sharpe Manufacturing Company, and this cart will be used for hauling coal to the mammoth plant from the coal pockets of the Eastern and Seaconnet coal companies, about a mile and a quarter distant, and for removing ashes from the works. The cart will have a damping body equipped with a chain hoist. Two batteries will be provided and the company will utilize current produced at its own power plant.

D. J. Cutter & Company, coal dealer, in Freeport street, Dorchester, has in its service two five-ton General Vehicle trucks equipped with dumping bodies that are used in general coal haulage, making from 30 to 35 miles daily. The first truck was placed in service Dec. 15, 1911, and the second Aug. 14, 1912. The trucks are loaded from hoppers or chutes by gravity at the coal pockets and capacity boads are usually hanled, but it is necessary to make deliveries by the usual means, either by dumping or by chutes, this requiring longer time than for loading. Both of these machines have given excellent satisfaction, the work of the first earning the order for the second. While the company has kept some data as to service it has practically nothing as yet as to maintenance, because there has thus far been no occasion for any other work than the usual attention. The second truck was acunited so recently that no maintenance statement can



Eldridge Front-Wheel Drive Five-Ton Cart I tilized by the Edison Electric Illuminating Company of Roston.

be made. The company places the dead mileage as half the total for the day, and estimates the tou-mileage to be from 75 to 87.5.

PUBLIC SERVICE STATION METHODS.

The Admirable System of Accounting the Vogue in the Woods Electric Garage, Philadelphia, Penn., Developed by Experience to Meet All Requirements.

By William W. Scott.

Till: application of system to a business means an accurate knowledge of every detail of revenue and expense, but to obtain these results it is necessary to have record of all works performed. It may be assumed by those who have limited knowledge that systematization is expensive, because to keep the records specific duties are required of different persons, and it may be believed that clerical work necessarily occupies time that may be profitably devoted to other work. It will not be maintained that record making can be left indiscriminately to different individuals, but it is absolutely certain that where systems are employed the causes for waste may be learned and means

taken to secure economy,

The electric garage is the exception and not the rule. Usually such stations are limited in volume of b u s iness transacted. and those that do exist are not sufficiently well s v stematized to regard them as examples for those who may contemplate engaging in such enterprises. Under ordin-

a ry circumstances the number of electric pleasure vehicles in starices the number of electric pleasure vehicles in service are comparatively few when contrasted with other types of automobiles. There are some garages that give service to such machines, but this is incidental to the general business done.

Some of the large concerns that utilize electric wagons and trucks for handage maintain their own garages, and these are conducted by differing systems, but such methods are not always applicable to general service. The business is often a routine that can be depended upon as to volume and its demands provided for, but there must be an elasticity in public service.

that will be sufficient to meet with all reasonable requirements.

One of the best examples of the public electric service station is that of The Woods Electric Garage, 21st and Market streets, Philadelphia, Penn, which is the development of the business established by J. C. Barrlett Jan. 15, 1909, at 1808-10 Chancellor street, the establishment having then a station with an area of 1800 square feet. A building 70 by 200 feet, with three stories in front, was creeted and was opened for business Sept. 1, 1909. This is the structure now occupied by the station today. When this station was opened for business it had three applications for service from

owners of electric cars, and gasoline machines were taken with the und e r standing that the service for such vehicles was to be given only so long as they could be accommodated and there was room for the electrics.

The demand for garage accommodation and sale-rooms became such that the building was not

sufficient to meet them and the Bartlett Garages, Inc., purchased the business from Mr. Bartlett and assumed control July 18, 1910. Additional property was acquired and on this another building was erected, four stories on Market and 21st streets, with a garage of the same proportions as the first, making the whole property 180 by 220 feet, given over to automobile salestooms.

and storage and maintenance. The buildings are of

brick and iron with stone trimming. The total floor

space is 92,400 square feet. The floors of the two ga-

rages are approximately 70 by 172 feet each without

a post, a bridge construction supporting the roof,



Woods Electric Garage, 21st and Market Streets, Philadelphia, the Offices at the Right of the Entrance and the Salescoms at the Left.



Office of the General Superintendent of the Woods Electric Garage and the Private Office Next Beyond.

The Woods Electric Garage occupies the first floor of the building first erected, there being a large entrance in the centre into the garage. At the right is a showroom, back of this a general office and the manager's office, a supply room and a stock room. At the other side is a large showroom, a ladies' room and a large elevator. There is no basement under the garage section of this structure. The other section of the building decorted to a garage parallels the original structure, and under this is a basement, and in this basement is located the repair shop and the battery room of the electric garage, access being by stairs and a car elevator at the street. The basement is large and

there is a passage so that cars may be taken to the repair shop as conveniently as though on the street floor.

The repair shop is well equipped with machine tools and facilities for repairing, and it is possible to do whatever work may be required, the workmen being thoroughly experienced with electric vehicles of all descriptions. Parts of the different machines for which the garage is agent are carried and are always available if needed. Any kind of work can be done as desired and with the equipment in the shop it is possible to meet any reasonable requirement within a limit of time. The battery room is unusually large and well equipped, with every facility for the proper care of all types of storage batteries. A corps of expert battery men are on duty night and day, insuring the highest class of service to the customers.

The garage floor given over to vehicle storage will accommodate approximately 150 machines of average proportions, and this number is now receiving care, of which about 80 are electrics. The policy of the garage is to take all electric cars, wagons or trucks that may make application, and to provide for whatever gasoline machines can be taken without encroaching upon the service for the electrics, but if necessary a gasoline car will be refused a continuance of garage attention to make room for an electric. In other words, electric mechines are given the preference. The electric vehicles garaged are about equally divided just now, but it is probable that the number will be incove, but it is probable that the number will be in-



Floor of the Woods Electric Garage at Sight, Showing the Machines at Either Side—The Capacity of This Station 14 150 Vehicles.



Self-Contained Charging Panel, Woods Electric Garage, Shawing Method of Bringing the Statlets to the Pharging Leads.

creased to considerably more than 100 with the return of the owners from their summer homes in the country and at the seashore, 0f the number now cared for about 15 are service vehicles, not including a battery of 28 two-ton electric wagons owned by the Adam- Express Company on temporary storage until a charging plant is installed and ready for service in the garage of the express company.

The front section of the garage is given over to the electrics and the gasoline cars are stored at the rear. There being no obstruction in the floor it is possible to economize every inch of space, and the machines are lined in rows against the side walls so that they may be driven out without difficulty. Along the walls are the charging receptacles or leads, these being arranged that 36 batteries may be on charge at one time, this outfil being large enough to take eare of

about 100 pleasure cars on regular charge. The charging panels are arranged conveniently along both sides of the floor and are accessible to visitors at all times.

The garage, as agent for the sale of Woods electric pleasure cars and for Walker electric wagons and trucks, is required to maintain a sales department for the display and demonstration of these machines. The demands upon the department are variable, but as the business is conducted with reference to making sales this division is always active. It will be understood that the garage really consists of four divisions, storage and attention, repairing, sales of cars and sales of accessories and equipment.

In the presentation of the system of conduct of the garage it is not intended to take up in detail the two sales departments, but it is proposed to describe the methods of accounting for the garage and the repair department, for these have been developed with a great deal of care and have been found to be in every way satisfactory.

In fixing the service rates for pleasure vehicles it was determined to break away front the established custom of making a flat rate covering everything, and to make a separate charge for each service, owing to the difference in attention necessary with the various types and batteries.

A uniform price of \$20 a month has been placed on the garaging of the cars, including washing and keeping the cars polished and cleaned inside and out. Current is supplied when necessary for recharging at the rate of five cents a kilowatt. Cars are delivered to the owner when so ordered, day or night, by steatly uniformed attendants. The charge for this service within half a mile limit is \$5 a month, and beyond that distance car fare for the return of the driver is also charged.

When a car on regular storage is placed on charge during the day, no charge is made other than for the current used, but after 6 in the evening a charge of 50



Battery Room of the Woods Electric Garage, This Department Being Fitted for All Manner of Service and Attention.

cents is made for storage, in addition to the cost of current. This is to prevent the leaving of cars in the garage ostensibly for charging, but in reality to get garaging facilities without cost, and impeding also, by crowding, the work necessary on the machines given repular service.

The attention given pleasure cars consists, besides storing, of washing, polishing and cleaning, oiling and greasing, and the work that is performed on them in the way of inspection, adjustments, etc., is additional. Repairing is charged for at a regular charge for labor, plus the cost of stock or material used.

The rates for commercial vehicles are worked out somewhat differently, owing to the fact that they can be counted on for 12 months' storage, while the pleasure cars have only about nine months' service. The prices of the garage are worked out on that basis, the costs, ranging from \$15 a month for a 500-pound wagon with panel body, to \$30 a month for a five-ton

Each sheet is ruled for 25 entries and for 12 columns, but one side being used. Above each column are the headings: Owner, Make, Type, In, Out, Washed, Cleaned, Charged, Account Shop, R. D and T. With reference to several entries across the page, the first gives the name of the owner of the car, the make of the car, the type of the body, and then check marks are filled in in the other columns, these indicating the following: If the car is in when the foreman goes off duty, if the car is out, if the car has been washed, if the car has been cleaned or polished, if the car is an electrie that it has or has not been charged, if the car is in the garage to be repaired, whether it is regular storage, whether it is dead storage, or whether it is transient. This log sheet gives an account of every car that comes into the garage for any reason whatever, and used with the transient card it prevents mistakes in the bookkeeping and the under or overcharging in the billing, and there is no chance of a car remaining



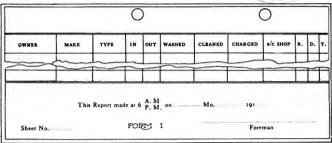
Section of the Repair Shop of the Woods Electric Garage, Which is Equipped with Every Facility for Building a Vehicle.

with express body; large panel bodies on the larger size trucks are charged for in proportion.

Current is supplied to trucks at the same rate as to pleasure cars, and this rate also includes, as with the pleasure cars, flushing with distilled water, cleaning and painting of the trays and battery compartments. Equalizing of the latteries in both cases is charged for at the rate of five cents a kilowatt, plus the necessary acid or water used in the rejuvenation.

For the purpose of accounting for each vehicle, whether regular or transient, with relation to the service given, what is known as a log sheet has been devised. This is a system for checking at the conclusion of each working day, morning and night, the ears that are in the garage at the time the foreman in charge leaves the building. The specimen sheet indicates fully what this requires, and aside from writing in the first three columns it is simply a matter of checking. in the garage for any length of time without a charge being made for it. The log is the result of observaation and experience of more than three years, and it is believed that the system will save enough in a single month to pay for the labor and printing for years. The sheets are made small for convenience in landling and any number necessary may be used. The sheets are numbered according to the period, two for each day, and each period sheet bears the period serial number. These sheets are filed in loose leaf binders.

The billing is by the hotel system, in which the tiems are charged each day and the bill as kept may be rendered at any time with a certain knowledge that it is correct up to the day of presentation. Each customer has an envelope assigned to him in a vertical file in which is kept every record pertaining to his bill, and after the billing has been completed for any given day any item may be instantly referred to. Each bill



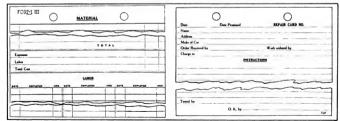
Form I, Reduced Specimes Sheet from the Log Book. Printed so White Paper for Loose Leaf Bluding, 8.25 Inches Length an Seven Inches Wilth, in Which Entries Are Written to the First Three Columns and Check Marks Made in the Remainle Misr Columns.

is kept in a loose leaf binder and the form has a stubthat is detached when the bill is submitted. Examination of the bill will explain the provision made for the daily items, and the summaries of the charges of every character. Comparison of the log Sveets will indicate some of the items included in the bill. Before the bill is mailed the records contained in the customer's envelope are checked to verify each charge.

For each car or machine there is kept what is known as the "daily current charge" card, which is self-explanatory. This card indicates the name of the owner, the date, the time (day or night), the make and type of vehicle, the trip reading of the odometer, the total reading of the odometer, and whetner day or night storage. Then follows the charging records, taken every hour during charge, these showing the hour and minute of beginning the charge, the voltage, the amperage, the ampere-hours, the temperature and the specific gravity of the battery, these entries being made in columns, there being 21 entries possible. In addition the record provides for other attention, under the head of remarks, these including the total amperehours, the total kilowart-hours, the cost, whether or not water was supplied the cells, if the battery was equalized, if new jars were used, the number of hours of lead burning, the reading of the meter at start and finish, the factor and the total kilowatt-hours. Space is given for the entry of readings if a watt meter is used to check the readers on the card. The card is numbered and it also shows the number of the folio on which billing was made and by whom it was posted. This record goes to the customer's envelope. The final entries are made when the machine is taken off the circuit and the cards are sent to the office each morning to be entered. All battery work in addition to the regular charging is charged for at 75 cents an hour.

In the mechanical work there is a monthly job card on which is charged the grease and oil used each day and the attention given to the different vehicles that may be included under the regular monthly charge.

Whenever a defect is reported by owner or driver,



Form III, Shop Repair Cinck, Lord for All Repair Work, Entered in Teplicate, the Ortainal on White Paper, or "Court Short, Guidez to the Officer the First Copy on Vision Paper, or "State [The Court Short, Court Sh

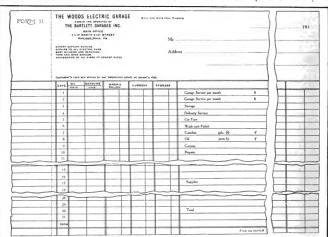
or is discovered in the examination of the machine, the vehicle passes from the monthly job card to what is known as the "shop repair card." This card is serial numbered, and issued in triplicate the white sheet rec-

numbered, and issued in triplicate; the white sheet going to the office, and known as the "cost" sheet, the
yellow sheet being kept by the foreman of the repair
shop, and known as "selling price" sheet, and the
manila card is fastened to the car. On these is entered the date of the order, date promised, name and
address of owner, make of car, order received by
whom, work ordered by whom, and to whom the bill
is to be charged.

Then follows instructions, written by the superintendent of service, which show the work to be done from the requisitions forwarded directly from the stock room. On the yellow, or shop sheet, the material and labor are all entered at the selling price, and after a job is finished is available to show the customer in case any dispute about the bill arises.

The expense is entered from the petty cash vouchers and the labor is entered from the time cards. The serial number of the job is shown on the bill and reference can be made to any particular job at any time through this notation.

The requisitions are all made out in the name of the customer, showing the stock or material required and each bears the serial number of the work order and the serial number of the requisition, and they are



Form II, Reduced Specimen of the Manthly Bill, Printed on White Paper 0.5 Inches Length and 12 Inches Width, with Stub Perforation 3.5 Inches from Left Side, the Stub Being Uned for Notes of Service Concerning the Hems Charged. The Bill Is Pasted Daily and the Trial Is Made up at the End of the Month.

on the ear, as well as instructions to the mechanics, to whom the work has been assigned, and there is a final entry to be made when the machine has been tested, that indicates the tester, and shows that the work has been approved by the foreman.

On the reverse sides of the office and shop sheets are sections for specifying the material used and columns for the prices, a section showing the date and hours of labor and by whom the work was performed, as well as a summary of the total labor and the total cost to the customer for the work.

On the white sheet all of the material and labor is entered at cost in the office, the items being entered signed by those receiving the articles requisitioned and the clerk delivering the order, this giving a double check on the stock room. The labor is charged to the department in which it is performed, either the repair shop or the battery room. The labor account is kept in loose leaf form in a binder that is known as the labor book. In this are entered the names of the men, the total amount of the pay for each week, and the total amount of labor by hours, this being extended to its proper column to "Machine," "Battery," "Garagge," "Watchman and Janitor" and "Office," each page being the account for six men for a week. The total for the page is obtained and to this is added the

PETTY CASH VOUCHER	Name						Date:
Cartaer	Time D	ad ad		he and	Tupe :	r Car	
	Cop Mar	,		Leta	Miles		high tra-
Telegram	A1774 WA	100.00	940-7		1101	phasets.	Fam man
Forgle							Solal Are, Hrs.
		_		_	_	_	Torsi A. dr. Po.
Espress	-				_	_	Cost
Telephone	-		_				Water in Batter
		_	_			_	Batter on Equal
Mesc	\vdash		_			_	Non-Jen
	-		_	_		-	No. Hrs Load I
	-	-	_			_	
	-	-	_	_	_		
	-	-	_	_	_	_	
	\vdash	-	-	_		_	Meter Frequ
Rec'd the above amount	\vdash	-		-		_	1 5601
		-	-	_	_	_	Factor ()
For account of			-	-	_	-	I make at the
D K bs		-	-	-	_	_	
former former		-	-	-	-	-	
fad by	\rightarrow	-	-	-		-	
Dans at No. Man	\vdash		-	-	-	-	
Date at Str. Man	-+1	-	-	-	-	-	
Charged	\vdash		-	-	-	-	fora No
	100	RM	1	7	-	-	Cord No
FORM IV	114	14	-4	-		-	
			_ 1			- 1	1986 100 01 00

Form IV. Petty Cash Voucher, an White Paper, 6.25 Inches Length and Four Inches Width--Porm Vt. Charging Card, on Thin White Card, Six Inches Length and Four inches Width, with line Horizontial and Red Vertical Railing.

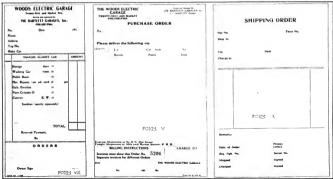
amount brought forward and then the total of the two is carried forward to the next page. It will be understood that this record can be applied to the day or to the week as desired, and it will show the cost of labor in each department, for the pages are numbered and the entries can be applied from any given date to another, and the total for each department can be ascertained at a glance for any length of time desired.

In the sale of gasoline, oil, grease, or any other supply or accessory a record is made on pink slips that are printed in rolls and a earbon copy is made on plain white paper that is also rolled. The entries are made with pencil. Each pink slip is numbered serially. The entry includes the date of the sale, whom the sale was made to, the make of the car, by whom the sale was made, the items and whether or not the transaction was cash or credit. The total amount received is entered and the slip is signed by the purchaser. The pink slip is given to the customer and the copy goes to the office. The stock room sells its supplies on the same general form. A receipt is made in duplicate and the original goes to the customer and the other to the office.

No vehicle is permitted to leave the garage without an order and that there may be no uncertainty the eall or order is received by an operator at the telephone, who makes out the order and places it in a clip on a board, a copy of the order being made. This

order remains on the loard until the time for the car to be delivered or callel for, and then the boys who take out or call for the ears take the order from the loard and when the order has been filled the slip is returned to the office. The earlion copy is a check on the return of the original and it may be referred to at any time, so that if the boys do not return their sheets to the office a record is there by which they may be called to account. The order system precludes any possibility of an error or an order being forgotten.

Should there be order given for a car to be charged



Form VIII, the Transient Card, Princia on Stont Manille Paper, 8.5 Inches Length and Four Inches Width, the Orders Being Stand by the Owner. This Card Serves for a Reveipt. Form V, the Professional Orders, SAS Inches Length and & Inches Width, Made in Virginiert on Wilder, Green and Salance Papers, the Original Coding to the Flum from Whom Parchase In on White Paper, 8.25 Inches Length and 3.5 Inches Width.

WOODS ELECTRIC GARAGE	CAR ORDERS
21st and MARKET ST. PHILA DELPHIA 100 Des 191 Sald to 192 Sald by 193	Dive Cu Ordered \$ \tilde{\pi}
	Remarks:
Amount Received	Time spent Hrs. Min. This slip must be properly filled out and returned to after immediately. FORM XI

Form IX. Sales Silp. Frinted on Pink Paper in Rolls and Numbered, a Carbon-Copy Belog Nade on White Papers Loradt Five Inches and Width 3.3 Inchess-Original Gors to Customer with a Pank Sale and Copy to Office—Form XI. Car Order, Frinted on Thin White Card Five Inches Length and 2.3 Inches Width, is Filled in by Telephone Deperator and Posted on a Board, from Which it in Taken by the Boy Making Delivery of or Reluraling a Car.

or other work performed, similar record is made by the telephone operator. When trouble is reported by a driver or owner the condition is written on this slip and it is noted by the foreman, who gives such instructions as are necessary, and if it is a repair job this is taken care of by the result order.

Transient cars are given a transient card filled in with the date, name, address, make of ear, together with the license number of the machine. This card contains instructions to the superintendent on duty for the necessary garage work, eovering, washing, polishing and storage. Also any instructions to the repair shop for adjustments. This card is signed by the owner, and is considered as an order, and at the completion of the storage is forwarded to the office. If payment is received the garage employee signs his name on the card, and it is surrendered to the office.

and a cash receipt, showing the amount, is signed, and given to the customer.

Purehase orders are made in triplicate; the white being the original, is sent to the firm to which the order is given. The first copy is made on green paper, and if chargeable to a customer is entered on his bill, and then placed in the envelope assigned to him. The second copy, on salmon paper, is placed on file for check against the vendor's invoice.

All of the articles or material bought are purehased through these orders, and as they come into the garage are sent to stock room anderedited on the ledger as stock, being entered to the stock account. As an article leaves the stock room it is put through an automatic stock book, which credits stock, and is charged to repairs, battery department or merchandise.

The regular accounts carried are:
Repairs, Battery Department, Merchandise, Expense,
Vehicle Sales, Vehicle Sales Expense and Equipment.

An automatic time clock in the hands of the telephone switchboard operator checks the arrival and departure of every single car in the garage, both night and day. This clock is locked and cannot be tampered with. This has been found to discourage soealled "joy rding" with customers' cars.

The same clock is used by the employees of the garage and shops to record the time of their coming and going, and this gives the pay master a report from which they are penalized if late. This card is used in addition to the regular time eards made out by the men at the completion of each day's work.

The organization of the garage includes the supervision of the president and vice president; the accounting is by the secretary and treasurer, and the

Page No.			LABO	R BOO	OK Da	ite	То	
NAMES	TOTAL PAY	TOTAL LABOR	Маснена	BATTERY	GARAGE	W. & J.	Orrics	
TOTAL								
THIS PAGE BROUGHT								
FORWARD SRNT FORWARD					FORM	VII		

Form VII, Reduced Specimen Sheet from the Labor Book, Printed on White Paper for Loose Leaf Binding, 14 Inches Length and 85 Inches Width, Ruled in Columns for Entry of Dollars and Cents, and Cross Ruled Every Six Lines for Convenient Grouping of the Entries.

sales manager supervises the salesmen, the demonstrations and displays at the shows. In the garage proper the vice president assumes the position of general superintendent and actually supervises the work and assumes all of the responsibility. Directly under him are the day superintendents, who control the day washers, polishers and cleaners; the stock from, the telephone service and night watchman; the night superintendent and his corps of washers, cleaners and polishers; and the superintendent of service, who directs the mechanics and the battery men. The office force consists of the bill elberks, accountants, cashier, stenographers, who are all under the direct supervision and direction of the general supermendent.

INTERESTING OMNIBUS BODY.

Detroit Concern Presents Novel Pay-as-You-Enter Type with Prominent Features.

The possibilities of the motor vehicle for omnibus service are being demonstrated in several cities throughout the United States and abroad, and within the past few months manufacturers who pay special attention to solving body problems have been working out plans which prove of decided interest. One such body, of the pay-as-yon-enter type, has been produced

by the Motor Truck Body Company, Detroit, a concern which has given much study to the subject. The result is shown in an accompanying illustration.

Se a ting accommodations are provided for 20 people, in addition to the driver. The arrangement and size of the seats are the same as in street cars and the driver's seat is separated from the rest of the body by a metal lattice partition, this extending along the back and side of the forward compartment to a sufficient height to prevent any interference with the driver by the passengers.

The illustration shows the harresting domain doors closed and the steps folded against the side of the wagon. Both doors are provided with spring catches so that they may be operated separately from the driver's seat by substantial lever connection. When the door is opened the folding steps immediately release and offer means for entrance or egress. There also is a lever under each door so that it may be opened from the outside if deemed necessary.

The body is strongly built of well seasoned oak and ash. The sides are panelled with metal, and the windows are of the removable type, permitting them to be taken out during the summer months. Two ventilators are provided, one at either end of the car. All windows, doors, ventilators, windshield and other removable parts are equipped with rubber bumpers to prevent rattling.

The roof is substantially constructed, with cross sills attached to the side posts, and is covered with continuous wood sheathing and the highest grade of heavy water proof canvas in one piece without seams. This canvas is given one coat on the underside and four on the outside with white lead and linseed oil. The roof has sufficient arch to shed rain easily.

All side windows are provided with curtains mounted on spring rollers which when pulled down are of sufficient length to close the space between the roof and side panels. Each curtain has a cross stiffening rod, the ends of which slide in wooden guides attached to the posts. They are made of water proof material, such as is used in street cars.



Interesting Omnibus Body Produced by Motor Truck Body Company, Detroit.

The interior is equipped with electric lights of six candlepower each attached to the roof in such positions as to afford the best possible illumination. It also is supplied with two 40 ampere-hour storage batteries for lighting purposes.

In every respect the workmanship is thoroughly in keeping with the high grade material and the appointments. As an indication of the extreme care manifest in this regard, it may be stated that the body is treated with 13 separate coats of paint, and the exterior appearance is such as to cause unusual comment.

The Piatt Engine & Boat Company, 382 Atlantic avenue, Boston, well known in the motor boat trade, has added a new line of motor trucks suitable for use by grocers, provision dealers, launderers, iarmers or any business requiring a light delivery wagon. The new truck is of 1000 pounds capacity.

LANSDEN ELECTRIC VEHICLES FOR 1913.

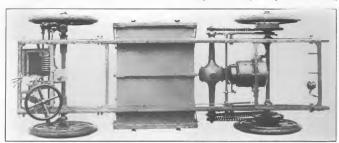
THE Lausden Company, Newark, N. J., a concern that claims the distinction of being the oldest corporation in America that confines its activities to the production of electric service wagons and trucks, has built these vehicles for more than nine years, the first machines being placed in operation early in 1904. During this period wagons and trucks of differing sizes were produced and utilized for varying purposes.

With the experience gained the company improved its vehicles from time to time as the conditions of use and the progression in electric vehicle engineering justified, and while the earlier types gave excellent satisfaction the desire was to reach a standard that could be continued for an indefinite length of time and compare favorably with other machines in the market.

The Lansden vehicles have been in the service of

as the 1912 model or type. The company did not hesitate at expense to refine its design and the machines were developed to secure the greatest simplicity, compactness and convenience in attention and maintenance, as well as insuring the efficiency as the highest practical point.

In this work of refinement the company's experts and specialists have been busy for a long period, giving attention to every factor entering the general problem, and under the direction of Frank Mueller as chief designer, Mr. Mueller having been for years associated with Mack Brothers Motor Car Company, Allentown, Penn, and for a considerable part of that association in charge of that concern's development work, has produced and is now manufacturing an improved truck, which is known as the Lansden 1913 model. The vehicles as perfected are regarded by the maker as being



Top Plun View of the Launden Chassis, Showing the Three Point Suspension of the Motor and the Driving System.

some of the well known concerns in the metropolis and have for years been used with a material degree of satisfaction, enduring consistently and giving a mileage that was sufficient for all ordinary requirements in urban haulage. The purpose of the company was to perfect these so far as possible and during the summer and autumn of 1911 a number of improvements, some of which may have been regarded as radical, were made in the design of the machines under the direction of Chief Engineer H. E. Heath. It should be stated that the vehicles of differing sizes are all made to the same general design, this being with a purpose of standardization.

These improved wagons and trucks showed in service that a great advance had been made in operating efficiency and in endurance as compared with previous productions, but the Lansden company was not satisfied with the results. It was believed that a still higher degree of serviceability could be obtained, and to attain this the endeavors of the engineering department were directed toward perfecting the design designated.

worthy of the attention of all persons engaged or interested in haulage.

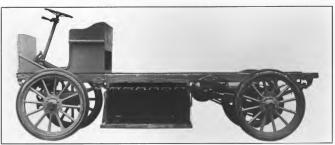
The purpose of this article is to describe the improved chassis and the qualities that are claimed for it by the maker, illustrating the mechanical construction and the features which are regarded as being of distinct character and of unusual value to the user. Reference to the accompanying illustrations will make clear the characteristics of the design.

Examination of the chassis will show that the vehicle is driven by a single motor with a first reduction by a bevel gear and the second by the usual sprockets and double side chains, the motor being energized from a battery carried in an improved cradle, or battery box. It will also be noted that the motor is located in the longitudinal centre of the chassis frame, forward of the rear asle, and that it is suspended from a strong cross frame member, the armature shaft paralleling the frame, and the motor shell is bolted to a spider that is fixed to and forms part of the jackshaft differential housing, making the motor and jackshaft assemi-

bly practically one unit. This construction gives a three point suspension for the motor and jackshaft. Another quality is the shutting off of all electrical energy when the service brake is applied, this giving the full power of the brake for controlling the movement of the vehicle. The value of this device can be understood by those who have experience with braking any vehicle with the motor in operation. The company has protected by patents the drop-door roller platform battery box, the unit three point suspension motor and jackshaft drive, and the controlling mechanism, and it is maintained that these are original with this concern.

In the design of the chassis endeavor was made to secure the simplest construction, with a view of minimizing the time necessary in attention and in maintenance, and to insure an endurance and dependability that could be relied upon through long periods of service, and yet with a view of reducing the weight prothe brake and passing through a stuffing box it enters the differential bousing, the pinion on the forward end of the shaft engaging with the bevel drive gear of the jackshaft. The spider is a part of the jackshaft housing, and as the motor and its shaft are held rigidly in alignment, no distortion of the classis frame will cause side pressure leverage unon the shaft or its hearings.

The jackshaft housing is composed of three parts, the centre section, which forms the differential housing, and which is webbed on the under side to insure strength, and the two side sections which house the aske shafts. These two side members are bolted to the centre section, so that the motor and jackshaft form a complete assembly. The differential is of the beed gear and pinion type and it is mounted in heavy bearings, the gears being of special steel and intended to be very enthring. The shafts are of nickel steel, heat treated to insure strength, and they are carried in heavy bearings at the outboard ends. All the bearings



Side View of Chassis, with Battery Box Open, Illustrating Ease of Access and the Simplicity of Construction.

portionately and maintain the strength and reliabilny so essential.

The power plant of the chassis is a series wound construction that is built to have unusual endurance. the materials being of high grade throughout and with ample margins of safety. The armature shaft is large and of special quality steel, and it is mounted in Hess-Bright ball bearings of the annular type. The motor is enclosed in a steel housing and it is water and dust tight. The machine is designed to have an overload capacity of 300 per cent, for 30 minutes, and momentarily it has a much larger productiveness without injury. The motor is suspended by a clamping band or strap from a strong frame cross member and it may be released from this by removing two bolts, easily accessible from beneath the motor. Bolted to the forward end of the motor housing is a heavy cast steel spider and the extension of the armature shaft carries a service brake drum that is within the spider, the external contracting band of the service brake being actuated by a lever. The armature shaft extends beyond are of the Timken make and are adjustable for wear. The jackshaft sprockets are extra heavy and are also specially designed for heavy duty. When assembled the jackshaft is operated in oil and is always fully Inbricated, the stuffing box preventing leakage of the Inbrigant.

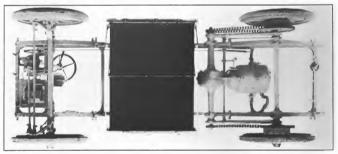
The jackshaft is mounted in heavy brackers below the classis frame and these are so designed that the jackshaft may be removed with comparative case when necessary. On the outboard ends of the jackshaft housing are mounted the forward ends of the radius rods, which are fitted with ball and socket bearing so that the stresses are compensated and the spring motion is free. These connections or bearings are adjustable for wear. There is a filler cap in the jackshaft differential housing by which the lubricant may be supplied.

The chassis frame is a channel section of special steel and there are five cross members, three forward of the battery hox or cradle and two back of the jackshaft, these being formed with integral gussets and are double heat treated. Besides these the battery box and the brake shaft and the jackshaft strengthen the frame to a very large degree. All the members are hot riveted. The spring horns, spring hangers and the jackshaft brackets are heavy steel castings, one bracket earrying the jackshaft, brake shaft and forward rear spring shackles, all of which are similarly riveted to the frame.

The springs are semi-elliptic that are installed without perforation and are of chrome manageness steel, oil tempered, and are designed to have great durability and afford easy riding qualities. The spring eyes are bronze husbed and the bolts are hardened and ground and are fitted with grease cups of large proportions to insure constant lubrication. The bushings are renewable when wear makes this necessary.

The rear axle is an extra heavy nickel steel forging that is double heat treated and is designed to resist unusually severe service. The axle spindles are very large and are fitted with Tinken roller bearings. channels and angles, cross braced and reinforced where necessary. The box is suspended from the chassis frame by steel brackets that are hot riveted to the side members. The side doors are designed to drop and are held by stont guides in a horizontal position so that the battery crates may be drawn out on to them for examination or work, and the crates are carried on wooden rolling platforms, there being channels on the floor of the battery eradle and the doors in which the rolls move transversely. It is possible to handle the battery crates with comparatively little labor and very quickly. The entire construction is light and exceedingly strong.

The control of the vehicle is exceedingly simple. Both service and the emergency brake are operated by ioot pedals of the receding type placed at either side of the steering column. The service brake pedal is at the right of the column and it is so designed that the controller is returned to the "off" position when the brake is apolied, and the controller cannot be used



Bottom Pian blew of the Lanadez Chassis, Dispinying the Jack shaft and Motor Suspension and the Control Mechaniam

The front axle is an I section, drop forged of nickel steel, and has very large yokes. The steering spindles are drop forgings of unusual size and these are mounted with Timken roller bearings. The spindles are also fitted with bearings of the same make. The wheels are of artillery type and are made of carefully selected material to the standard dimensions of the Society of Automobile Engineers. The rear wheel construction is unusual in that the hubs and brake drums are combined in single castings, the design making for great strength and insuring against stresses when the wheel brake is used. The brake drums are large in size and will endure for years in constant use. All wheels are mounted on Timken adjustable bearings. The tiebar and the drag link are both heavy and are carried in front of the front axle, where they are easily accessible.

The battery box or cradle is of the side-loading type illustrated and these are constructed of steel

until the pedal is released and the brake is free. This prevents the operation of the motor so long as the brake is in service and there is no possibility of the brake being dragged, using the current unnecessarily and imposing excessive strain on the motor and the transmission system. The service brake is located on the extension of the armature shaft between the motor and the jackshaft. The emergency brake pedal is at the left of the steering column and it has a ratchet lock attachment so that the brake may be locked so long as desired. There is a supplementary lever release pad and the brake is with internal expanding shoes within the drums on the rear wheel hubs. The brake levers are long and the brakes are easily operated with moderate pressure, the rods being with direct pull and the leverage is positively applied.

The steering gear is a high grade worm and sector construction that is fully enclosed and packed with grease. Being dust and water tight there is but little



Rene View of Lanaden Chansis, the Brake and Wheel Construction Clearly Shown.

reason for wear and there are adjustments for compensation when the parts become worn. The steering column is at the left side and the post is slightly inclined. The steering head and post, controller tube and brake pedals are carried on a single easting with a bell shaped cap to give additional support and protect the controller operating mechanism.

The controller is a continuous torque type of the latest construction with four speeds forward and two in reverse, that is fully enclosed and protected, and it is gear operated by a handle on the steering post, located at the left side of the wheel, the position being decidedly accessible. The vehicle movements correspond to those of the controller, being forward with the advance of the handle and reverse with the backward movement. There is also a locking device by which it is possible to prevent the use of the machine by any person unauthorized to operate it. The controller resistance is fireproof mica insulated and it has cast iron units, the assembly being protected by a metal casing. The safety switch is a special design that has a large overload capacity and its form is very compact. It is enclosed in a dust and fireproof easing and provided with a key that is removable when in a charging or open circuit position, but is held in the switch when thrown into the position for vehicle operation,

The battery is a latest type Edison of sufficient capacity to give more than the rated mileage, the number of cells, (0, being what is necessary to permit charging from the usual 110-volt circuit with the least possible external resistance. The charging receptacle is of standard make with enclosed concentric contacts and a spring-hinged cover. All of the power wiring is made with flexible heavy rubber-covered cables of double normal current capacity, protected by special wrapping, insulating varnish and fibre wherever necessary to prevent wear. The wiring is further protected, yet is decidedly accessible, by being run in the channels of the chassis frame.

The tires are selected to secure the size and qual-

ity best suited for the conditions of service, high efficiency and durability being two of the factors governing the selection. While strength and endurance have not been slighted in construction to secure minimum weight, care in designing and choice of materials have resulted in the production of vehicles as light as are consistent with the requirements of the rigorous service the trucks are built to withstand.

The vehicles are made with load capacities from 500 pounds to five tors and have been demonstrated to have unusually high efficiency and endure under the hardest operating conditions. They are simplified to forms consistent with satisfactory operation, and in practical service will undoubtedly prove the best machines that have been produced by this contern.

BOSTON ELECTRIC VEHICLE CLUB.

The Electric Vehicle Club of Boston at its first autunn meeting, held Sept. 12, voted to make the organization self-sustaining and a committee was appointed to draft a constitution and bylaws and to establish an annual due for membership. It was the belief of the members that the body should be independent and that it would be a large influence in the promotion of the use of the electric vehicle with energetic endeavors. W. A. Weatherby, representing the Anderson Electric Car Company, was appointed to the advertising committee to fill a vacancy. The plans for the entertainment of the delegates to the third annual convention of the Electric Vehicle Association of America were considered and determined, and there were addresses by William W. Scott of the MOTOR TRUCK, Frank J. Stone of the Electric Storage Battery Company, Converse D. Marsh and by representatives of the daily press.



Front View of the Lansden Chassis, Demonstrating the Control Levers and Pednis.

ELECTRICAL EQUIPMENT FOR THE GARAGE.

Electro-Mechanical Devices Specially Designed to Economize Labor and Insure Greater Economies in Public Station—The Facilities of Today.

By Charles L. Benjamin.

IN THE early days of the automobile when the lines of the car were modelled upon those of the horse drawn vehicle (just as the early railway car differed little in appearance from the stage coach it supplanted)—in those early days of an infant industry which has since grown to giant proportions, it was natural that the bicycle repairer of the town and the local delivery man should join forces and open the first garage. They were the logical men for the job. But the nature of the job has changed and with the change has come a demand for a type of man possessed of higher technical knowledge, broad business experience and larger capital.

The management of a modern garage calls distinctly for a high-grade man, with a corps of capable mechanical assistants, one of whom at least must be an electrical expert. The extent to which electrical apparatus is used in this industry cannot be fully appreciated unless one passes in mental review the various applications of electricity to be found in an upto-date garage. Ten or 15 years ago one word would have sufficed—"lights," Today an article filling sevcral pages of the MOTOR TRUCK permits of only the most superficial treatment of the subject.

Passing over the matter of electric lighting with its array of cables, conduits, switches, junction boxes, fuses, lamps and fixtures, etc., we proceed at once to what may be called the electro-mechanical equipment

of the garage. This will include the motors, starting rheostats and speed regulators used in the repair shop, rheostat for vulcanizer, motor driven air compressor for inflating tires and supplying air blast for blowing dust out of upholstery, charging rhe-stats for the ignition batteries and lighting batteries of gasoline cars and for the storage batteries of electric vehicles, and—in the case of the garage maintaining its own power plant—an engine-generator set. Garages of more than one story in height will also be equipped with an electric freight elevator and probably with motor driven pumps and suitable starting apparatus for fire pump service. Provision for suitable ventilation will also call for motor driven fans and blowers.

The battery charging rheostat is one of the most necessary pieces of equipment for the modern garage, especially so if charging electric vehicles forms any considerable portion of the business. In a garage now being completed for the American Express Company in New York City—probably the largest private garage in the world—no fewer than 300 Cutter-lammer charging rheostats will be installed. Incidentally, the fact that this great express company is preparing to handle all of its New York business with electric vehicles is an indication that the motor truck is at last receiving the consideration to which its many advantages over the horse drawn vehicle entitles it.

The increasing use of the electric vehicle calls for garages especially adapted to this class of service. When local business men have failed to grasp this opportunity the vehicle manufacturer sometimes takes

the initiative himself. The case of the Anderson Electric Carriage Company's garage at St. John's place and Bedford avenue, Brooklyn, is an example of a manufacturer stepping in







Fig. 1-6 barging Rheostat for Mounting on Rear of Switchboard.

Fig. 2-thurging Rheostat. Floor

Fig. 3-Charging Rhrostat for Mosaling on Wall or Front of Switchboard.



Fig. 4-View Showing Cuffer-Hammer Battery Charging Panels in Konmeler Garage, Wilminster, Win

to provide the necessary garage and expert charging treatment for both pleasure and commercial vehicles. This garage was completed about a year ago and a description of the charging equipment may be of interest.

Thirty vehicles can be charged at one time and the charging equipment is suitable for charging truck and cars using the nickel-iron or the lead battery. The equipment and general layout of the garage received careful consideration. There are 30 charging outlets, three outlets being grouped at each of 10 stands. The station is very clean and roomy. All lighting circuits are run in conduits and all battery circuits are run from the charging board to the outlets in conduits under the floor. The charging outlets are located about one foot above the floor.

The Cutter-Hammer charging rheostat panels shown in the illustration, Fig. 9, are so designed as easily to be augmented. Each panel is a charging unit

in itself except the one at the right. This panel carries at the bottom a three-pole main line knife switch and fuses, one charging unit for charging three ears, an additional charge-discharge switch for discharging any battery on the circuit through the charging theotat, and a charging rheostat for charging ignition batteries. The small swinging panel carries the voltmeter and a revocecuter type ammeter which indicates in one direction on charge and in the other on discharce.

The other three panels are all alike, each being a complete frame so that when more charging outlets are required it will not be necessary to make any changes on the original equipment. The only connections between the frames are the main busbars, which are mounted near the top of the back of the panels. The connections to the battery-charging circuits are made at the bottom of the sanels.

The three outlets at each of the 10 charging stands



Fig. 5-Row of Type C Churging Panels.

Fig 6-Single Type C Charging Rheostat Unit.

are connected in series and these can be connected by means of a double-pole, double-throw switch to either the 110-yolt or the 220-yolt circuit. If only one car is



Fig. 7--- Particularly Salted for Charging Piranure Vehicles in the Private Garage.

being charged, the switch is closed in the 10-volt position. When two cars are being charged at the same rate they can be connected in series on the 110-volt circuit, at least for starting the charge (unless the combined counter voltage of the batteries is in excess of 110 volts). For finishing the charge the batteries are connected on the 220-volt circuit. By this means less energy is wasted in the resistance of the rheostat. For three cars the switch is thrown in the 220-volt position for the entire charge. The fact that the three outlets of each stand are connected in series does not prevent entiting out any car. Another may be substituted, or the vacant outlet or outlets may be short circuited by means of plugs pravided for the purpose.

One pilot lamp is provided for each outlet, which burns when the battery is plugged in, indicating to the attendant at the board at all times the outlets in use.

The double-throw switches of the charging panels are arranged so that in the 110-volt position, with all circuits in use, the system is balanced, half the switches being connected to one side of the three-wire system and half to the other side.

The rheostats are arranged for a large number of steps over a wide range to secure fine regulation. Each rheostat except the one designed for charging ignition batteries has two sliding contact arms, one of which is provided for the large steps and the other for the fine adjustments of current. Ten steps of the latter equal one of the former.

Each circuit is provided with a single-pide ammeter switch, giving a reading on its particular circuit. This switch is designed so as not to break the circuit during the period of throw-over. The reading obtained, therefore, indicates the exact condition of the battery. The garage is supplied with energy over a three-wire, 230-115 volt service from the Edison Electric Huminating Company of Brooklyn.

The illustration, Fig. 4, shows the charging panels installed in the Kopineier Garage, Milwankee, Each panel has three charging rhoostats of the shiler type, the grid type resistance being mounted on the back of the panel. There are between 50 and 60 pleasure vehicles cared for here and 'about the same number of gasoline automobiles.

The latest types of battery charging panels have a number of important features which are in line with the other advances made in the electric vehicle industry. On these panels the arrangement is such that the instrument switch does not open the main circuit and burn and roughen the switch blades every time a meter reading is taken. This arcing is especially severe on large equipments where 150 to 200-ampere currents are broken, as anyone having experience with opening knife switches under such conditions well knows. The latest panels are designed to allow the operator to get a reading of the battery voltage and charging current by a movement of a single switch lever, without the breaking of the heavy charging circuit. This method of getting readings is much more convenient also than the method which required an ammeter switch and voltmeter plug. The operator has just the one thing to do-move a single switch lever-and (especially in large garages) cutting down the number of things the operator must do, is of considerable advantage and encourages the taking of frequent readings since it entails little inconvenience.

Another reason why the plug system is being su-



Fig. 5-Automatic Protective Devices

perseded is that where there are several panels, each having a plug, short circuits are liable to occur. This is due to the fact that after one reading is taken the plug may be left in place and when the next reading is desired on some other rheostat of the same panel the plug of the adjoining panel may be used. This



Fig. 8-Battery Charging Board, Anderson Electric Car Company, Brooklyn, N. Y.

will at once cause a short circuit and blow all the fuses on the board. Some other method of securing readings is therefore desirable. Arranging the charging rhoostat with its operating handle directly alongside of the main knife switch and instrument reading switch for that particular rheostat makes accidental short circuits impossible. Each group is a unit in itself and is connected to its own charging outlet. The operator knows by a designation, such as a number, which charging rheostat to operate when charging a car at any of the charging outlets.

Convenience or ease of operation of the rheostat are of course is necessary. The charging equipment, therefore, should be arranged so that all rheostats and switches are within reach of the hand. There may be a few eases where, because of lack of space, the



mounted above the s w i tchboard and the

rheostats

must be

lever pushed up or down by means of a cane with a hook or ring at one end. However, as a general thing, this is not good practise and in the equipments built today the design avoids this arrangement if possible.

As the number of vehicles cared for by a garage is bound to increase with the increasing popularity of the electric pleasure and commercial vehicle, the battery charging equipment should be installed so as to allow for additions. The charging panels should be of such design as to be easily augmented to provide for additional charging outlets. As with the filing eabinet system it should be possible to add units in rows stacked in various heightts whenever needed.

Each of the two panels of the charging board shown in the illustration, Fig. 13, has assembled on it eight charging rhoostats to take care of eight separate charging outlets. Moving the lever over the contacts arranged in an arc of a circle gives the various currents required. The resistance which is mounted back of the slate panels is of the grid type. No meters are shown as for this particular case they were mounted on a swinging frame to the left. This entire switch board is only 56 inches wide and the uppermost switch and lever can be easily reached by anyone of average height.

Charging rheostats such as the floor and wall type units are for use in private garages where there may be only one or two vehicles and where the operator in attendance has considerable knowledge of electricity. They are built for use on direct current circuits ranging from 110 to 115 volts and are designed to charge the battery at the maximum rate until the cells are nearly infly charged, then at the minimum rate until the battery attains to its maximum voltage, which is the method of charging generally practiced.

Where a direct current circuit of 125 volts or less is not available for battery charging it is usually more economical in the long run to use a motor-generator set, the generator being designed to deliver direct cur-

rent at 110 to 115 volts pressure. Where alternating current only is available a motorgenerator set must also be used, the



Fig. ti-Automatic Low Current Cul-Ont, Lever Type.



Fig. 12-Ignition Battery Charging Rheostat,

motor being an alternating current type and the generator the same as in the preceding case. In either of these cases the additional equip-

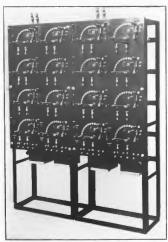


Fig. 13-Two New Type Cutler-Hammer Battery Charging Papels, Each Consisting of Eight Bheostats.

ment necessary besides the motor-generator set consists of a starter for the motor and switchboard having generator field rheostat, switches and meters for obtaining readings of the generator current. The rheostats illustrated in Figs. 5 and 6 can be mounted below the charging switchboard panel or above. When placed above, however, it is necessary to operate them by means of a cane and hook, which is not very satisfactory except in cases where just a few are used.

The charging panel shown in the illustration, Fig. 7, is especially designed for the private garage where automatic charging is desired and protective devices that will insure battery from damage are required. These protective devices, which are shown at the bottom of the panel, are also used where a complete panel of this type is not required. For this purpose they are mounted on a separate panel as shown in Fig. 8, the devices being, beginning at the left, a low current (disc type) cut-out, maximum voltage cut-out, main line solenoid switch and overload circuit breaker. When installed as a separate device as illustrated in Fig. 8 the protective panel is put into operation by raising the plunger of the low current cut-out until the disc mounted on the plunger comes in contact with the disc posts. This admits current to the solenoid switch which closes the main line circuit. The maximum voltage cut-out automatically opens the circuit when the battery voltage reaches the point at which this eut-out is set to operate, while the overload circuit breaker serves to protect the battery against excessive currents. Failure of current will result in deenergizing the low current cut-out which in turn deenergizes the solenoid switch opening the main line circuit.

The disc of the low current cut-out is held in contact with the disc posts as long as a sufficiently strong current continues to flow, but upon a decrease in current to approximately one-fourth of normal, the magnetic attraction of the solenoid weakens and the plunger drops opening the circuit. However, when desiring to manually open the circuit this plunger should not be pulled down, but the main line knife switch should

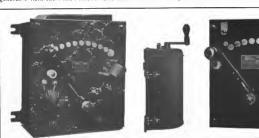


Fig 14-Motor Starter for Direct Curre

Fig. 15-Controller for Motor Operated Machine Tools, Lather, Etc.

Fig 16-Motor Speed Regulator for Fans, Pumps, Etc.

be opened. This will result in the weakening of the solenoid of the low current cut-out which allows the disc and plunger to automatically open without injurious arcing.



Fig. 17-Regulator for Varying Tem- ing magnet in se-

The lever type of low current cutout, Fig. 11, consists of a lever privoted at one end and carrying a laminated copper contact brush mounted near the hub, the lever being held uormally in a horizontal position by a retainjurt megnetic in a.

peralter at Valenthers. ries with the battery. Upon a decrease of current to approximately one-eight of normal the magnet releases the lever which falls of its own weight, opening the circuit.

As in the case of the disc type low current cut-out described, a handle is provided for ebesing the circuit manually, and the caution against forcibly opening the circuit of the disc type cut-out while full voltage is present applies also to the lever type, the counters of these devices being designed to open circuit on low voltage only.

As many garages take care of both electric and gas-dine cars, small charging rheostats especially designed for charging ignition batteries used on gasodine automobiles are included in the electric equipment. The illustrations of two types are shown in Figs. 10 and 12. One of these is for mounting on the wall or switchboard and is operated by the lever at the top. The larger type carries a slate panel and two singlepole knife switches, the closing and opening of which varies the charging rate.

Besides charging rheostats there are other devices included in the electric equipment of the garage. Electric lighting is the best means of illumination and frequently it is desirable to have all-porcelain sockets and switches, such as are illustrated in Figs. 18 and 19.

Porcelain is not attacked by acid vapors and other gases and as most garages are built without basements and have cement floors built on the ground the porcelain devices prevent shock when handled. An electric vulcanizer is now part of the equipment of many garages and the small six-inch regulators shown in Fig. 17 is used for varying the current in the vulcanizer which regulates the heat.

In the repair shop the motors used for driving the machine tools will require some kind of speed controller. The small drum type controller illustrated in Fig. 15 can be mounted directly on the machine and gives the operator easy means for varying speed to suit the work he is doing. For motor driven pumps, ventilating fans and similar types of machinery the speed regulator. Fig. 16, is especially adarted. This is similar in appearance to the Cutter-Hammer motor starter, Fig. 14. Where simply a constant driving speed is desired the only controlling device that is required is the starting rheostat, which provides means for bringing the motor from rest to full speed. The lever is passed over the successive contacts from left to right, gradually increasing the speed. Automatic controllers are used to a considerable extent with compressors and pumps also.

Because of the fact that so much of the success of the electric garage depends upon the electrical enuiment the selection of apparatus should receive careful consideration. The increasing use of the electric vehicle will stimulate the establishment of garages and every day's experience will mean the betterment of conditions in the electric vehicle field.

CONTINUE SUMMER SCHEDULE.

United States Tire Company Finds It Necessary to Work Three Shifts All Winter.

All of the United States Tire Company's factories will be operated during the coming winter on full summer schedule, which means that they will be run night and day, three shifts of workmen being employed. The decision to continue this plan, begun last year, was reached at a conference at New York City between General Manager J. M. Gilbert and the company's factory managers, W. McMathon, Detroit J. M. Patterson, Providence, R. L.; Harlow, W. Waite, Indianapolis, and C. B. Whittlesey, Hartford, Com. The conference was under the direction of C. J. Butter, vice president of the company and supervisor of production.

Last winter was the first time in the history of the tire industry that it was considered necessary to maintain a full summer working schedule throughout the secalled "off" senson. The plan worked so satisfactorily that its continuation was decided upon. The four factories produced more than 1,250,000 tires during the year and their [913] output will be far it ex-



Fig. 18-Porceinin Pendant Switch.

Inin Posh-Buttos

Fig. 20— tulemobile Battery and 1, 1 gb 1 ing

cess of this number, the equipment of each having been increased and a new plant, the largest of its kind in the world, being in contemplation.

ELECTRIC VEHICLE ASSOCIATION OF AMERICA.

By Harvey Robinson.

and its various al-

lied lines of busi-

ness. Yet in this

association 325 manufacturers of

electric vehicles.

storage batteries.

accessories and so

forth, and a goodly proportion of "cen-

tral stations" where

electric current is

made, are co-oper-

ating with enthu-

siasm to the one end

of extending the use

of battery-propelled

ments that have

played a conspic-

Like other move-

motor cars.

N OT only in the motor truck field, but in all American industries probably, the Electric Vehicle Association of America is unique. Nowhere is competition more spirited than in the automobile industry



W. H. Blood, Jr., President of the Electric Vehicle Association of

nous part in the development of the uses of electricity, in the cities in particular, the Electric Vehicle Assuciation was a conception of Arthur Williams of the New York Edison Company. Two years ago last May the association was formed at a meeting Mr. Williams had called in his office. It then had 20 members and its activity, like its memberhip, was almost wholly confined to New York City. In these two years it has multiplied itself 11 times in size, and extended its direct influence all over the United States. The headquarters are still in New York, but there is a large New England branch with headquarters in Boston; a similarly important branch in Chicago; and third and fourth branches-one in Philadelphia, and one on the Pacific Coast.

In the early days of the association carpers were very ready to suggest all manner of "concealed interest." Chiefly they questioned the connection of electric light stations with the organization, or, the disinterestedness of their connection. Yet nothing that the association has done has been so important in broadening the field of electric vehicles as securing the co-operation of the central stations. There was not enough in it for them to make it worth while to have adequate facilities for charging or changing storage batteries such as are used in automobiles. On the other hand the use of electric motor cars was restricted because of the infrequency of charging stations.

Largely through the good offices of the association these two interests have been balanced so that now the charging business is at least a self-supporting feature of the central stations, while the territory in which electric motor cars can operate has been enormously enlarged by the increase of charging facilities. This kind of mutual benefit well illustrates the function of the association and the success with which it is performed.

The other important work which faced the association in its beginnings was to correct some common misapprehensions about electric vehicles which had delayed their wider adoption as compared with gasoline cars. Unfortunately, the misapprehensions were quite natural, and had given rise to deep-seated distrust of the practicability of the electric, in the minds of business men. They are to be blamed on the salesmen of the first crude electric cars who, in their anxiety for commission and salary increases tried to create a volume of business by making the most extravagant nomises.

The manufacturers of both electric trucks and pleasure cars never intended them for any but city service. For this they are, in the improved form of the present, unequalled for safety, convenience and contony; they are not yet equipped for long distance work, and cannot be until some radical improvement of the storage battery makes them so. The old time salesman of electrics, however, in his eagerness to go the gas car one better, ignored the manufacturer's pelicy, told the prospective purchaser that he could get all kinds of things it was impossible to put into an electric out of it, and

sowed the seeds of disappointment, distrust and disfavor.

The winning back of public confidence, especially when it was originally based on an undeveloped machine -as the electric was then-which at best n e e d e d some time and faith for making good-the winning back of confidence in these circumstances is about as hard a proposition as an organization of business men ever has to face



liarvey Robinson, Treasurer and Assistant Secretary of the Electric Vehicle Association of America.

The character of the Electric Vehicle Association and the genuine spirit of progressiveness in which it was started are told best by the results it has achieved in increasing the number of electrics in use. Such rapid headway did it make that between July 1, 1911, and July 1 of this year, the number of electrics in New York City alone, in daily service, jumped 45 per cent, while the increase of electrics in Boston, Chicago, Philadelphia and other large commercial centres was nearly, if not quite, as surprising. To get the full force of this statement it should be remembered that these same two years in which the association has been working cover the period of the most rapid development of gasoline cars as business utilities.

The association's latest achievement and the work it has laid out for the immediate future appeals to motor truck men as well as to motor truck users, as overy practical value. It is the standardization of certain parts of all electries so as to simplify the power problem. In order that the same charging equipment can be used for all makes of cars the charging plug must be uniform in all cars. The association undertook a campaign to secure this miformity and has just succeeded in bringing its efforts to a satisfactory conclusion.

Now the association has under way studies on which may be based recommendations for the standardization of other common details of design and construction. It also has taken up the problem of economy of operation and maintenance—such as matters of power economy, tire economy and the like. The results of these investigations will be the common property of all members.

Realizing that the best method of correcting misapprehension and putting the electric into just the place it is intended to occupy is by the nse of frank, unbiased advertising—"copy" which is effective to the highest degree yet is so general that it gives no particular build of electric ear any advantage over any other make—the association has carried through a national publicity campaign. At the same time some of the member companies have supplemented the national advertising by doing local advertising along the same lines. A fund of \$50,000 or more has been set aside already for use during the coming months, in which the advertising campaign is to be pushed harder than ever, and similar appropriations are planned for succeeding years.

In order that the problems it takes up may have most expert consideration, the association has organized itself into a group of committees which divide its field for concentrated effort. There is a committee on standardization, for example, one on insurance, one on contests, another on transportation, a fifth on rates and charging stations and a sixth on operating records.

LEAD BATTERY CARE AND MAINTENANCE.

MANY of those who contemplate the purchase of an electric pleasure car or commercial truck hesitate because of their fears that they must have considerable technical knowledge in order to properly care for the

battery. They imagine that the battery requires constant attention to give satisfactory service.

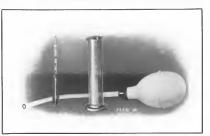
As a matter of fact no such difficulties are presented. An idea of the case with which a battery can be operated may be had from the following instructions, which have

been prepared by The Electric Storage Battery Company, manufacturer of the "Ironel a d-Exide," "Exide," "If y ea p-Exide" a nd "Thin-Exide" batteries so generally used in etectric vehicle service:

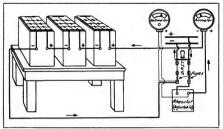
"Open the battery compartment to obtain ventilation. Commence charging at the

higher normal charging rate in amperes, as stamped on the name plate of the battery, and continue at this rate until a sound of active gassing or bubbling in the cells can be plainly heard by placing the ear close to the battery. Then reduce the rate to the low rate stamped on the name plate and continue until the bubbling or gassing can again be clearly heard. This is the simplest method of determining approximately full charge and is sufficiently accurate for general operation between the periods of overcharge, as follows:

"Once every Iwo weeks give the battery an overcharge. To do this simply continue charging after the battery has began to gas freely at the low charging rate until four (4) successive readings of the voltmeter on the switchbard or car are the same, these readings



Electrolyte Testing Outfit, Which May Be Used Instead of the Hy-



Battery Removed from Vehicle Connected for Receiving a Charge.

being taken at intervals of one-half hour.

"At the same time that the voltmeter readings are taken, hydrometer readings of two cells in different parts of the lattery should be taken. These four (4) successive hydrometer readings on each of these cells should likewise show no change. If they increase, showing a rise in the gravity, the charge should be continued until there is no further rise for two (2) successive readings.

"Note, however, that the charge must be temporarily stopped if the temperature of the battery reaches 110° F., and must not be started again until it has dropped to 100° or lower.

"The electrolyte consists of a mixture of pure salphuric acid and pure water in such proportions as to show a nominal specific gravity of 1,280 when the battery is charged, but the battery will operate successfully between the limits of 1,250 and 1,280 when fully charged. If the specific gravity is below 1,250 it is an indication of insufficient charge rather than an insufficiency of sulphuric acid in the cell.

"Keep the level of the fluid in the cells one-half (1/2) inch above the top of the plates. When it falls below this point add ours water, NEVER ACID.

"Do not charge the battery if from experience with the vehicle it is known that the next trip can be made without charging.

"On the other hand, never allow the battery to stand entirely or almost entirely discharged."

In order to promptly and successfully care for the requirements of its customers. The Electric Storage Battery Company has cstablished branches in most of the principal cities and towns. In addition the company employs an extensive and competent ecrops of inspectors who are constantly travelling about giving any assistance or information required by battery users. Between the visits of

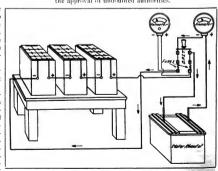
the inspectors users can get by telephone or mail advice or information on any points that may be desired.

It should inspire the confidence of the prospective purchaser to learn that thousands of those who never heard of a storage battery until purchasing an electric car are successfully operating batteries by following the brief instructions outlined above.

MOTOR TRUCK SCHOOL.

The demands for experienced motor wagon and truck drivers has been such that the West Side Y. M. C. A. of New York City has established a department for the justraction of

young men for this work in connection with its automobile school. The school was inaugurated eight years ago and during its existence more than 6000 men have been enrolled as students. The work is taken up systematically and it is especially beneficial to those whose employers are changing from animal to mechanical vehicles. The course consists of shop work and lectures and practical road driving, and the school has a large truck which is driven and is demonstrated in the school work. The student has the option of taking both driving and shop work, or either of these branches, and in addition to this he is assisted to obtain a state license to drive, and often employment is obtained for the scholars, as applications are frequently received for competent men. The school was urged to train truck drivers by firms that had had difficulty in securing competent and trustworthy men, Incidentally the original school was established in cooperation with the Automobile Club of America, and its courses of mechanical and driving instruction have the approval of undoubted authorities.



Proper Connection of Battery for Making a Test Discharge of Current.

PLAYING FAIR IN ELECTRIC TRUCK SALES.

How "Honest" Jim Smiley, an Energetic and Persistent Salesman, Interviewed a Hard-Headed Prospective Customer—A Dialogue of Possibilities.

By F. Nelson Carle.

Nate: Smiley has tried for three months to reach E. Kelly Jones, directing genius of Hort & Jones, Inc., wholranie grocers Tarned down by letter, telephone and personal calls, he discards his business card and giving sleeply the name of "Smilry" to the boy at the gate, at last reaches the laner sanctum.

66 OOD morning, Mr. Jones."

"Good—(looking up) What do you mean by butting in here under false pretenses, Mr. Smarty? I thought you were my friend Col. Smiley or I'd never—"

"Very sorry, Mr. Jones. I had no intention of misleading you for that means a bad introduction. But now that I AM here won't you let me post you a little on what the other big men in your line are doing with our trucks? The electric as you know.——"

"Electric be hanged. I wouldn't have a motor truck about the place anyway and least of all an electric. Biggest farce on earth. My brother-in-law in Spartansburg——"

"Bought two in 1903, didn't he?" eagerly put in Jim, who knew the facts, "and had a lot of trouble with them. I should think he might. The roads out in those hills are awful. But our new trucks—"

"Roads? What kind of an excuse is bad roads? Never saw one of you fellows yet that didn't crawl into some hole. People don't want excuses, they want machinery that will save money. The darn things will come into use some day. I suppose, but power trucks are too much of a gamble yet, especially anything with a battery in it. " Now, I've still got a stack of mail here, and the sooner I get rid of you the sooner I will get something of importance done."

As he met the level gaze of the older man, Jint's eyes began to twinkle. "Mr. Jones, how old is this suit I have on?"

"Why a month or so, I should say."

"No, sir, the coat at least is 2200 years old. It's an evolution of the old Roman toga—an antiquated sort of a cape, as you know. * * * The motor truck isn't a new idea—it's an evolution of the old Assyrian cart. The bicycle and the tonring car are only one branch of the family—not the whole tree as some people think. The motor truck got here when the world needed it, and not three days before. Look at the thousands in use! In five years big firms won't THINK of trying to get along without it. Your firm won't. If you ever get even OXE good truck working for you as it ought to work, you wouldn't sell it any more than you would scrap all your typewriters and go back to long hand."

"Very good. Very good. Your style of argument, Mr. Smiley, is interesting if nothing more. But," and the old warrior's face lost its bantering smile, "that last qualification of yours leaves us just where we started. 'Where can I get the truck that will run as it should?' Now, just a minute, suppose the truck were all right in itself, who's going to keep it on the job? I'll even grant that big Jack Mullen could learn to drive anything anyone else could, but that's no insurance. It's the steady plugging I want. None of your off days in bad weather; no weekly visits to the repair shop. I want SERVICE and I want you to understand I'd buy nothing else."



"Good-What Do You Menn by Batting in Here Under False Prejenses, Mr. Smarty?"

"Mr. Jones, we have been in business ever since the truck industry started. For the last six years we have been selling trackless transportation and I think selling it intelligently. We have no quarrel to pick either with users of horses or with our competitors, The horses have been here a long time and some of our competitors make mighty good trucks. We claim simply this: The well built electric can be operated at a known cost. In its own field there is nothing which can approach it either in efficiency or economy. If you were a retail furniture man delivering goods 50 miles out I'd recommend a gas car right off the bat. But you don't go even 15 miles out and for your work our trucks are the best proposition on earth. The upkeep cost is about half what a gas truck of similar capacity would be because for your work a gas car is a round peg in a square hole. An electric on the other hand would be outclassed in the furniture man's deliveries.

We sent back a signed contract the other day because the route to be covered by the truck was a little beyond what we cared to guarantee with our electrics. If our competitors would be equally broad minded there'd be more trucks sold, because each one working would sell another, perhaps 10. If I didn't know absolutely that our trucks would save you money and more money than any other machines on the market, I wouldn't be here."

"Just like the rest of 'em. Fine arguments, fine promises. Smiley, I know what it costs us to haul our goods with horses. I don't know and you can't prove to me what it will cost us to haul stuff with your trucks. I know you have a lot of 'em running around, but each man's business is different. Even in our line



"Bah! Electric Be Hanged! Biggest Farce on Earth!"

no two firms do things just alike. A horse is slow, but he gets there. I've had three touring cars and I know how an automobile eats up money. Me for the horse, And now for heaven's sake get out and let me work in peace."

"Mr. Jones, if you'll give me half a chance, I'll show you that you don't know what it costs you to truck with your present equipment. I'll show you in black and white that each pair of working horses you own costs you \$1.72 per day every day in the year for feed alone. I'll prove to you that each double team you operate really costs you \$8.16 per day, if you only pay the driver \$2. Upones begins to figure rapidly.) Then I'll prove to you that one of our \$3.5-ton electrics displacing two double teams and giving you one-third more mileage can be operated for \$10.35 per day, over

a period of five years if necessary. There's a saving of \$5.81 per day per truck and you want five trucks. That means a possible saving of \$29.05 per day or for 300 days \$9715 per year. That's the profit on how many cases of tomatoes?"

"Tomatoes be ———! Young man, you're pretty near right on the feed question, but where in thunder do you get your \$8,16?"

"Proportionate expense," affirmed Jim. "Here's the figures," (Reading rapidly from back of envelope.) "Pro rata rent and stable expense per horse per day 27 cents; shoeing and small repairs 16 cents; harness repairs (so much), etc., etc. Depreciation for renewal of horses 21 cents per horse, per day: 88.16."

"Nonsense, we never figure all that stuff in. No one does."

"Yes, some one does, and the firms who really know what horses cost are the ones who get the truck fever right away. I'll gamble half of the expense out of my salary that any chartered accountant in the city will go 10 per cent, over my figures in giving you your horse costs for the last I2 months. You see I happen to know you lost three horses in the last hot spell. On the truck end of it, knowing the routes you cover, I'll get the company to give you a maintenance guarantee that three or six 3.5-ton trucks will not cost you more than an average of \$10.50 per day each. That means what it says for we have enough in the old sock to back it up. Doing it every day in fact * * * Blank & Co. of Philadelphia bought two in 1907, three in 1909 and there's an order on the books now for three more to be delivered this month. S & S operate 17

"That listens good, but tell me this: (To office by who brings in card: No, ask him to see Jenkins.) If all the big firms you sell are saving so much money why didn't I hear of it before? The minute we put in a new elevator or build another warehouse the whole trade knows it. Your story is too good to be true. Smiley * * Why, man, the land our stable is on is worth about \$30,000. If we could do away with both stable and horses as that brewer you mentioned in your last letter did, and put up a small garage back of our No. 2 house, can't you see that we'd clean up altogether about \$50,000 inside of three years?"

"Which would more than buy twice the truck equipment you need," nodded Smiley. "Wipe out the whole investment and then some. That's the wrinkle, Mr. Jones. Scientific trucking with electrics means more than selling four horses and puting in a big truck to do their work. And now I'll tell you why men in your line are not falling over themselves to buy trucks. The big firms in any line who are successfully operating good trucks are making so much money that they try to keep still about having trucks at all, unless it is in emphasizing deliveries to new customers. They're tickled to death to have others stick to horses. They're not going to give you or me figures which will show their savings with trucks. You are fortunate in one way for your competitiors across the street are still

in the same boat as you are. If ——— & Co, had some of our big moguls in place of those hired teams of theirs, you'd soon feel it, believe me. If you could save even \$5000 a year with the equipment I mentioned would you multish it?"

(Jones, squirming a little) "I guess I wouldn't, that's a fact. But what if the trucks fell down? I like the idea of no smoke or fire danger and if you'll really guarantee your operating costs, I'd be inclined to take the matter up with the board next week."

"That's fine, Mr. Jones, and you'll never be sorry.

"Now, don't jump at conclusions; I haven't said we would buy a shingle nail from you. We don't ———"

"I know, Mr. Jones. I have been selling trucks too long to count my chickens. I want you to feel that you can bank on what I tell you. As I said in that first letter, we've got now to where we know just what our trucks will do and we can make guarantees intelligently. They've had the kinks taken out of them in real work. You'll find that five of our trucks.—"

"There you go again!" interrupting with a gesture of despair, "you ought to know we wouldn't think of selfing all our horses at one crack and putting in five trucks. To get rid of you, I'll say that we may eventually buy one of your machines and try it out. And when I say try it out I mean it. We'll find out what's inside of it, don't worry."

"Of course you will, but not exactly as you think you will. Let me tell you that we would prefer to see von put in our machines progressively. Buy one now and the rest later. When you ARE ready to give us the order (grinning) I'll take care of things for you myself. When the truck comes there'll be a service man with it that big lim (foreman) will take to right away. He'll help you break in one of the drivers and he'll stick here until you are satisfied the driver knows his business. You can garage at Downey's for a while * * * Let me make one suggestion: Don't make the truck use that narrow end of the platform where the teams will block it in. Give it a chance to load and unload just as fast as possible. Later you can save a lot of money by moving that platform any way and incidentally having that yard repayed. But there, you'll be booking for a gun in another minute * * * (reaching out hand) Good morning, Mr. Jones, Thanks awfully for the time I've taken; I know some day you'll say it was a good investment,"

(Curtain.)

CALIFORNIA OWNERS ORGANIZE.

Los Angeles Men Follow Example of Those in New York and the East.

A movement to unite all owners of business automobiles has resulted in a new organization at Los Angeles, Cal., formed at the rooms of the Automobile Club of Southern California and known as the Motor Truck Club. The association is along similar lines to that in New York City and other eastern cities which have brought truck owners and dealers together for mutual henefit. Recently the Commercial Truck Harbor Highway Association was organized at Los Angeles to promote the interest of a commercial truck highway between that city and the harbor and since then matters of more general interest to truck men have developed, lending impetus to the latest organization, which will attempt to solve the many vexing problems presented.

There are now more than 1000 commercial cars in Los Angeles and according to W. F. Wood, temporary president of the new club, the city has shown a greater increase in the number of motor trucks used than any other in the country, not excepting New York City, and the commercial uses of automobiles are wider than in any other section. Therefore, a club of owners, it is held, would be particularly beneficial to



"Not tak Him to See Jenkins!"

its members and a general invitation has been issued to such owners urging them to affiliate with the new organization. The directors are: David L. Whitford, J. B. Livezey, M. H. Conneil, Leo L. Kelly and George B. Harrison.

Southington Pleased with Knox—One of the finest pieces of motor fire fighting apparatus thus far seen in Connecticut has been placed in operation at Southington, where it was delivered by the Knox Automobile Company. Springfield, Mass. The truck is a model M 3 motor driven combination. It is equipped with a four-cylinder motor, with 5.5-inch bore and stroke is rated at 50 horsepower. The frame is especially constructed for fire department service, being made from channel steel, with front bumper of the same material so attached as virtually to make the entire frame one solid piece. The car is guaranteed to attain a speed of 40 miles am hour and before being placed in service it was demonstrated in the cities of Meriden and Wallingford, Conn.

CHARGING THE EDISON STORAGE BATTERY.

By Harold H. Smith.

THE charging of the Edison nickel-iron-alkaline storage battery is one of the simplest items in the work of the battery man because of the very important fact that a battery of this type, if properly cared for in other respects, cannot be injured by electric current, providing only that, in labitual practice, excessive heating be not permitted. This is a sweeping statement and it means that in accidental or special instances this battery may be charged at high rates or at low rates, it may be overcharged indefinitely or undercharged, it may be overcharged indefinitely or undercharged, it may be short circuited or charged with polarity reversed without more serious result, if any at all, than a delay incident to correcting the error and charging properly.

It is perhaps because of this immunity from permanent injury, due to error or negligence, that careless habits are apt to creep in upon the battery man in the garage.

The charging characteristics of the Edison battery are different from those of other types and the same criteria cannot be depended upon. It is hoped that herein may be given such data as will indicate what shall be done in various circumstance in

The normal charge has been more or less arbitrarily chosen as one of seven hours at the rate appropriate to the size of the cell. This length of charge yields neither the maximum output nor the maximum efficiency, but has been deemed to strike the best balance between these opposing factors. The greatest possible output will be obtained after a 10 or 12-hour charge, and charges not exceeding four hours in length will yield an ampere-hour efficiency of not less than 95 per cent. It is thus seen that to suit different conditions of service it is entirely possible to choose lengths of charge, other than normal, that will most satisfactorily fulfill the conditions. It must be remembered in this connection that time-element undercharging or overcharging cannot in any way injure the battery, though, of course, useless overcharging is inimical to good efficiency and will make more frequent watering of cells necessary.

The normal charge used only be given, of course, when the battery has been completely discharged. If after a partial discharge, full capacity is required, it would be a useless waste of energy to recharge for the full normal period, and in such case the length of charge should be in the same ratio to a full charge as was the previous discharge to a complete discharge, For example, a battery which is normally charged for seven hours is discharged to the extent of only one-quarter of its normal output; a charge of one hour and 45 minutes, or one quarter of seven hours, will bring it up to a fully charged condition. This rule applies to all proportions

Since the inconvenience of specific gravity readings is obviated in the Edison battery, except after eight or nine months to determine if a solution renewal is necessary, the question of how to know the amount of the previous discharge naturally presents itself to one who has become accustomed to depend on hydrometer readings for this information. There are, however, other methods more simple and as dependable for all practical purposes. The ratio of the mileage covered to that possible, in the case of automobiles, has been found to serve as a most satisfactory and readily accessible basis for partial charging. The length of time the battery has been discharged also serves as an indication when the average length of discharge under similar conditions is known.

The best method is that employing an ampere-hour meter. If the meter be provided with a differential shunt, the operator used have no further care than to see that the battery is charged at normal rate until the meter pointer has returned to zero. If there he no differential shunt the pointer must be advanced before the charging is begun and the charging then continued until it has returned to zero. In either case the meter should be set to recharge 25 per cent, in excess of discharge.

If there he no means whatever of knowing the extent of the previous discharge, charging by voltage may be resorted to with very satisfactory results. As the battery nears a state of complete charge the voltage rises rapidly and finally reaches a maximum which it will maintain indefinitely as long as charging is continued. This maximum under ordinary temperature conditions will lie between 1.80 and 1.85 volts per cell with normal current flowing. When the voltage has remained constant at somewhere near these values for at least half an hour it may be safely assumed that the battery is charged. If the surrounding air temperature is very low the maximum value will be higher, and if the temperature is high the maximum voltage will be lower, so that actual values should not be too rigidly insisted upon. It may easily be recognized, by means of successive voltmeter readings, when the maximum has been reached, by its constancy,

In the foregoing discussion charges at constant nomal rate only have been dealt with, and wherever possible they should be employed. Such charges, however, require frequent attention to keep the current up, for since the difference of potential of the battery increases as the charge proceeds, the current will decrease unless the rheostat be readjusted from time to time. Such attention is not always practicable, in which case the current should be set considerably above normal and allowed to taper off as it will. The proper initial current value is such that the average during seven hours will be equal to the normal rate. This value depends upon the relation between the line voltage and the number of cells in series. A good tapering charge will result if 167 volts per cell be impressed across the battery without any resistance in series. In this instance the initial current will be found to be almost double normal. In charging a 60-cell battery on a 110volt line, sufficient resistance should be placed in series to give an initial current of about 1.5 times normal.

Except toward the end of such a tapering charge, charging should not be done at less than normal rate, for a temporary sluggishness during the discharge immediately following will result. This will not be the case when discharging is done at less than about the 15-hour rate, when a lower charge rate may be used if desired, but this condition will seldom obtain in automobile practise.

While overcharging as a general practise is to be deplored for reasons of economy and convenience to the user, as already pointed out, there are times when a charge of 12 hours will be found desirable. This is the case always when an exceptionally high output is required regardless of efficiency. Further, a battery is not at its best when new, but continues to improve in efficiency for a considerable time after being put into service. It has been found that overcharges tend to hasten this improvement so that when a battery is ready for use it is well to make its first charge 12 hours long and to repeat the overcharge at the end of the first month and again at the end of the second month. After that overcharges need not be given except that it is always advantageous to give one long charge immediately after renewing the solution. On the average this will not be more than once in eight or nine months.

Under certain conditions of service "boosting" or charging at high rates for short periods is found to be almost a necessity. For example, the daily mileage of a truck may be very materially augmented if its battery be "boosted" during the noon hour, normally a period of useless idleness. As a common practise "boosting" is permissible with the Edison battery for, due to its construction, the active material cannot be thrown down as sediment. Excessive heating is not advisable, but the temperature may be allowed to get as high as 115 degrees Fahr., or even higher in infrequent instances without deleterious effect. In general five-minute boosts at five times normal rate to onehour boosts at double normal rate will be found to yield satisfactory results. Current consumed in this way will be returned on discharge at practically 100 per cent, ampere-hour efficiency,

It may now be appreciated that the great flexibility of this unique battery in the matter of charging is a point decidedly in its favor and that its qualities are such as to relieve the owner, who must depend upon his garage force, of much needless anxiety.

Seagrave Ladder Truck—The Seagrave Company, Columbus, O., has delivered a motor ladder truck to the fire department of Columbus, O., the officials of which believe the increased protection will ultimately result in decreasing the insurance rates of the city.

SUCCESS WITH GARFORDS.

New York Concern Will Replace 40 to 50 Horses with Six Five-Ton Cars.

The Watson Contracting Company, New York City, is one of the large concerns doing an extensive trucking business that uses Garford trucks usade by the Garford Company, Elyria, O., to transport heavy loads. This company has received numerous repeat or-ders from firms which have experimented with its product and the New York company is one of the latest to give testimonial to the worth of the trucks. For some time the concern has operated two two-ton Garford machines and they proved so successful that six five-ton vehicles were ordered recently. In writing to the Garford company, President Thomas B. Watson said:

"In accepting your proposition to furnish us with six more five-too Gafrod dump trucks, for which you will find signed coutract herewith, we desire to express our complete satisfaction with the two Garford trucks that we have had in use for the last six months. Each one has replaced from five to six teams. Their operation has been constant and dependable, so that we are now fully warranted in putting in a complete motor truck equipment. The service and inspection has been thoroughly satisfactory and we can only speak in the highest terms of the treatment received from your company. We propose to sell 40 to 50 horses as soon as the motors are delivered, therefore please push this order through as quickly as possible."

PEERLESS IN EXPRESS SERVICE.

Replaces Ten Horses, but Increases Business so That Horses Are Soon Back at Work Again.

A peculiar result followed the introduction of motor trucks at Newark, N. J., by the United States Express Company. Although unforeseen, it was important in affording ample opportunity of comparison. The company installed a Peerless three-ton truck, made by the Peerless Motor Car Company, Cleveland, O., which at once replaced 10 horses, the latter being sent to the company's stables at Jersey City, N. J.

But the truck had scarcely begun to operate when the improved service over an expanded territory gase such an impetus to the business that it increased to such proportions it became necessary to put the horses at work again, one team at a time. This will be continued until there are enough horses again in use to warrant replacing them with another motor truck.

Some idea of the work done by the Peerless can be gleaned from the statement that during 25 days it carried 470.051 pounds, ran 945 miles and made 1363 stops. This is a daily average of 18.802 pounds, 33.8 miles and 54 stops.

NEW GASOLINE-ELECTRIC OMNIBUS.

By Daniel S. Carpenter.

F OR over three years gasoline-electric omnibuses have been in regular operation on Fifth avenue. New York City, and have demonstrated that they meet the requirements of this service perfectly. The General

service after a careful study of the requirements.

The running frame is of double armored wood with pressed steel cross members, all hot riveted with stout gussets and corners. The sub-frame for the engine and



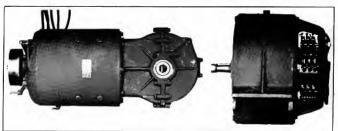
Gasoline-Electric Passenger Omnibus Used in Fifth Avenue Service in New York City, Equipped with a General Electric Company's Generator and Motor.

Electric Company, Schenectady, N. Y., has built the electrical equipments for these vehicles, and within a few months has delicered one for the equipment of on-nihus No. 15, changing this over from mechanical to electric one motor drive. The advantages of the electric drive are simple and easy control, relatively low cost of maintenance, reduction of wear and tear of transmission and engine, smooth acceleration and quictness of operation. As hus No. 15 represents the latest development in this line of buses, a brief description of it will be of interest.

The chassis or running gear of the new gaso-electric omnibus is designed and made especially for this

generator has three points of suspension, which arrangement relieves the motive unit from nuclue twists and strains. Transmission from the motor countershafts to the driving wheels is by the regular De Dion drive to the rear axle, an electric antomobile motor being substituted for the gear box. Long half springs support the omnibus at front and rear in an effective manner, resulting in easy riding. Steering and driving wheels are of artillery design, 34 and 40-inch diameter, respectively. tire equipment consists of fourinch single solid motor tires for the steering wheels, and

3.5-inch twin tires of the same kind for the driving wheels. The front axle is a steel forging, the steering wheels being mounted on pivots of the inverted Elliot type. An axle of the built-up type of construction is used at the rear. This consists of a large steel tube with heavy walls, on each end of which is securely fastened a steel casting, forming not only anchorage for the main driving wheel brakes, but a support for the axle arm stubs. All wheels run on conical roller bearings. The chassis has a wheelbase of 168 inches, with front and rear wheel ganges of 67.5 inches and 72.5 inches respectively. There are two independent sets of brakes of liberal dimensions. A foot pedal client sets of brakes of liberal dimensions. A foot pedal



Type GE—1627 125-Volt 60-Ampère 1300 Révolutions Per Minute Type TD—6—7.5 Form C 125-Volt 60-Ampère 200 Révolutions Ver Minute Generales.

operates the motor brake, while a hand emergency lever actuates two large internal brakes on the driving wheels. Steering is effected in the usual manner by means of a hand wheel operating through gear and sector.

The gasoline engine which is used to drive the generator is of De Dion make and is of the four-cycle type with four cylinders,

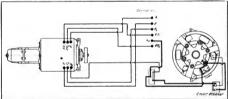
The generator is a six-pole machine, each pole being slotted on the entering side, forming a small auxiliary pole about which most of the series turns are wound, By saturation of this tip, series excitation is limited. and a drooping characteristic is the result. A further effect of this saturation is to give good commutation at times when the field is otherwise weak. Several series turns entirely encircle the pole, the shunt winding being placed over all. Here is, in effect, a commutating pole generator, with high overload characteristics and fine commutation at all loads, which is quickly selfexciting, and at the same time is of light weight. This machine is known as the TD-6-7.5 kilowatt generator, and is rated at 125 volts, 60 amperes, at 900 revolutions per minute. It may be run at 100 per cent, overload for two hours with 70 degrees C.

rise of temperature, and at 80 per cent, overload continuously. It has an efficiency of 85 per cent, at normal load and weight about 500 pounds. When in operation it has been short circuited without stalling the engine, taking 285 amperes at two volts.

On trial tests the first gasoelectric omnibus chassis, with a load of 6500 pounds, was run up grades of 12 to 15 per cent, without stalling. opened the number was increased to 22, including every sub-station in the city.

All of these "lunching" places are equipped with a two-outlet charging board so that two machines may be charged at the same time. Every year the company issues an eight-page booklet giving the location of the various charging stations which it maintains, as well as the names and locations of all other charge ing stations in Manhattan, the Bronx, Brooklyn and 30 odd suburbs of New York with the distance of each reckoned from Columbus Circle. It also includes a table of distances in New York City and vicinity, a man of Manhattan Island, and a road map of New York and suburban territory showing the location of electric anto charging stations not including those in New York and Brooklyn. This booklet is attractively arranged by the advertising bureau and mailed to all users of electrics in New York.

Although with the improved types of batteries and cars there is no such need for the local charging stations as there used to be, still their convenience is often proven. Particularly in the winter time are they of value when a car meeting with the adversities peculiar



Wiring Dingram of the Gasoline-Electric Omnibus, Equipped with Single Motor Drive.

WHERE ELECTRICS "LUNCH" IN NEW YORK.

By A. H. Miller.

In the early days of the electric vehicle, before the mechanism or the batteries had reached their present high point of development, it frequently happened that sufficient mileage was not available on one charging of the batteries to carry a car to the end of its route. In those days batteries fully charged only held enough juice to carry the vehicle for about 20 miles. So it was that a demand arose for charging stations at various points throughout the city where the batteries could be "boosted" and thus make it possible for a car to be driven to its destination.

The New York Edison Company came to the rescue and in the early part of 1907 established the first station where electrics might charge. It at once became apparent that the company's various sub-stations about the city would make ideal charging stations for electric vehicles and two years after the first one was to the season needs a slight boost to carry it to its destination. Or perhaps when the batteries have fallen short of their early efficiency after a long period of use there will generally be enough juice to carry the vehicle to a nearly charging station where "refreshments" can be secured. Then, as frequently happens, a car is taken out without forethought as to the amount of juice that will be required to carry it through the day's work, but a convenient charging station saves it the disgrace of being towed in. These are only a few of the instances when the charging stations are in-dispensable.

Trucks for Signal Corps—Tennsylvania national guardsmen are experimenting with the motor truck in the transportation of military supplies and it has been found that for "flying columns" requiring rapid movements in the open country, the gasoline propelled forage wagon eclipses the time homored lumbering vehicle drawn by the army mult team. The proposal to equip the signal corps with motor driven instrument wagons has been advocated by several officers.

CORRECT CHARGING OF LEAD STORAGE BATTERIES.

By James M. Skinner, Engineer of the Philadelphia Storage Battery Company.

THE whole proposition of correct lead storage battery charging may be summed up in the one rule—"Get enough current into the battery and get it in with a minimum of gassing." There is no doubt that the general observance of this rule, particularly the latter part, would increase the average life of lead batteries 20 per cent. or more, but this fact does not seem to be generally appreciated. Fig. 1 shows a case where the gain was about 30 per cent. The task of this paper will be to briefly discuss the dangers of undercharging and of overgassing, and to describe a practical charging method whereby these may be avoided and the battery life greatly increased.

A lead vehicle battery consists briefly of positive and negative plates, separators, sulphuric acid and hard rubber containing jars. The positive plates consist of

BATTERY LIFE UNDER SAME DISCHARGAS CONDITIONS

AND DIFFERENT CHARGING METHODS

PHARES WITH DULY
MODERATE GASSING

CHARGED WITH
ACAST GASSING

COMPRIANTY SPECIMAN GYARGE

COMPRIANTY TOTAL AMPERE MODRIS

COMPRIANTY TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL TOT

supporting and current conducting grids, and active material in the form of red-brown lead peroxide. The negative plates consist of similar grids and a peculiar grayish amorphous form of metallic lead known as sponge lead. It may appear at first sight that it is a rather difficult problem to keep both of these elements in good condition with the same charging treatment, because, apparently, treatments which are beneficial to the positive are harmful to the negative, and vice versa. But a closer examination will prove that it is a perfectly simple and easy matter to so adjust conditions as to keep both positives and negatives in perfect shape.

Improper Charging.

Much of the improper charging which batteries receive today is harmful, not because the wrong thing is done, but because it is done at the wrong time and in the wrong way. Overcharging and undercharging are good or they are bad, depending only upon when and how they are applied. The first essential toward the betterment of conditions is a thorough understanding of the effects of each, so that they may be used with proper discrimination.

Consider undercharging first. Undercharging to a moderate extent is not detrimental to a battery, and if mixed with proper overcharging is highly beneficial. Details on this point will be given later. On the other hand persistent undercharging with too few overcharges will result in a great deal of trouble. It is very seldom that something can be got for nothing, and no battery will deliver more power than has been previously supplied to it. If the charges are unduly shortened the capacity will fall off and the battery will develop sulphated plates, the cost of current for remedy-

ing which will far exceed the saving on the curtailed daily charges.

Troubles from undercharging manifest themselves chiefly in the negative plates. When in good condition charged negative plates have a soft, velvety texture, easily indented by the finger nail. This appearance is characteristic of sponge lead. As the battery discharges the plates absorb sulphuric acid from the electrolyte, and part of the lead sponge changes to lead sulphate. Lead sulphate is hard. Consequently a discharged plate feels harder than a charged one. When the battery is recharged the acid comes out of the plates again and the material resumes its velvety texture. If an insufficient amount of current is sup-

plied to the battery some of the hard lead sulphate is not changed back to sponge, but remains in the plate when the charge is stopped. If undercharging is persisted in an additional small amount of sulphate is left each day and the quantity at the end of several weeks or a month will be considerable. The sulphate particles are very small when first formed. If allowed to remain in the plate they steadily grow larger, since the solubility of the lead sulphate in the acid is sufficient to permit of their slow, but continual solution and redeposition, during which process the smaller particles, whose solubility is greater because of their greater surface per unit weight, dissolve more quickly and redeposit on the slower dissolving, larger particles, causing these to continually increase in size. The larger the particles the harder it is to reduce them back to lead sponge. Sometimes they grow so large as to be entirely unreduceable except by special and time-consuming methods. As long as it remains in the plates this accumulation of lead sulphate subtracts just that much lead from the active material, and by clogging the pores with a non-conductor, adds just that much obstruction to the passage of the current to the material in good condition. Moreover, being possessed of little cohesion, it is likely to fall from the plate, and perlaps carry with it or loosen some good active material. It should be perfectly evident from this how undercharging, if persisted in, will do great harm to the negative plates. There is sometimes a pressing need of a Society for the Prevention of Cruelty to Batteries, to intervene in behalf of batteries which are being starved to death.

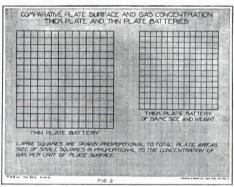
It seems, however, that troubles due to undercharging are on the wane. Battery owners are becoming more and more familiar with battery requirements and

are disposed to supply current in far more generous proportions than formerly. Moreover the general change in the last few years from thick to thin plates has reduced the amount of charge current necessary. The old thick plate batteries with their smaller capacity are necessarily more completely discharged on a given run than the higher capacity thin plate batteries. The thick plates are very deeply sulphated, and the inner portions of this sulphate are not easily reached by the charging current. Either much current will be wasted in gassing or sulphate will be left in the depths of the plate after each charge. The evil effect of the latter condition on the negatives has already been discussed; the effect of the

gassing on the positives will follow. Thin plates batteries are not as completely discharged, the sulphate is necessarily nearer the plate surfaces and easily accessible to the reducing action of the current, and due to the larger number of plates, there is about 50 per cent, more plate area on which the current may act. Thin plate batteries therefore require less charging current than the old thick plate type.

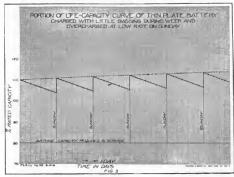
Turning now to overcharging—every battery needs some overcharging to keep it in good condition. But care must be taken how these overcharges are given. They are not in ordinary service needed every day, and they should not be carried out at a high current rate because of the gassing which accompanies them. Gassing is the greatest factor in wearing out a positive plate. Eliminate or reduce it and the life of the positives shows an incredible increase. As batteries are usually charged, gassing occurs, not only during overcharges, but at the end of ordinary charges. The passage of the charging current tends to decompose the electrodyte into hydrogen and oxygen. In fact these substances in the nascent form do travel toward the electrodes, hydrogen with the current toward the negatives, and oxygen in the opposite direction toward the positives. Lead sulphate has the property of absorbing them as they are driven against it. During the early stages of the charge there is an abundance of lead sulphate in the plates and the hydrogen and oxygen react with it as follows:

| Posture Plate. | Photo | Proceed | Photo | P



Thin plate grows less and less. If the current rate is maintained narged, the safe tits original value, the same quantities of hydrogen plate sursand oxygen are generated per minute, but with a decreasing amount of sulphate, it becomes more and more ger number difficult for them to find material on which to act, until finally the rate of absorption falls below the rate of production. In this case some hydrogen and oxygen han the old material on the gaseous form, and force their way through the active material into the electrolyte. The longer the charge continues the greater the proportion of the current used in generating gas.

The hydrogen bubbling out through the negative plate pores is not particularly dangerous. It may dislodge or blister a little material, but sponge lead possesses a high degree of coherence, and is further protected by the flat face of the wood separator pressing against it. It requires pretty hard and continuous gassing to harm a negative by overcharging. On the other hand the lead peroxide of the positives is not so blessed. It possesses comparatively little coherence of its own and heavy gassing is apt to destroy that put in by the battery manufacturer. The face of the active material is constantly washed off, falling to the bottom of the cells as mud, and the whole mass is opened up and softened. In very extreme cases the peroxide becomes of the consistency of mush, and of just about as much coherence. Thus the life of a positive plate is directly dependent upon the amount of gassing, and the importance of a systematic charging procedure which will minimize this can hardly be overestimated. The general adoption of thin plates has been a step in the right direction, because as previously mentioned they possess over 50 per cent, more plate area than the thick plate batteries, and have therefore 50 per cent, more surface over which the gas can escape. The plates are subjected therefore to only two-thirds of the thick plate gassing wear. Fig. 2 illustrates this point.



To recapitulate a moment, a battery contains two very dissimilar elements; positive plates, harmed by overcharging, and demanding a minimum of current for long life, and negative plates, suffering from undercharge and requiring plenty of current for good service. As one of the large vehicle companies very aptly puts it, "the positives are injured by overfeeding and indigestion, while the negatives suffer from starvation and exhaustion."

Evidently a combination of moderate undercharging on most charges, with a special care toward keeping the current below the gassing point at all times, and occasional overcharging at a very low current rate, so as to again minimize gassing, will meet the requirements of both. In actual practise the procedure has given remarkable results. A more detailed acrount follows:

1. The ordinary daily charge is started at a moderately high current rate, not over the normal six-hour discharge rate, and the current is maintained at this point until toward the end of the charge gassing commences. The rate is then lowered below the gassing point, and the charge continued until the evolution of gas again commences. Here the rate is once more reduced. Tapering the current so as to keep it always below the gassing point is continued until a very low figure, about 1-10 of the normal six-hour dischargerate, is reached. At this point the charge is usually stopped, although there is no danger in continuing this low rate for a few hours more. After a very long and thorough discharge it may indeed be a good thing. As suggested by Mr. 11. M. Martin in his excellent communication on the same subject, published in the Electrical World, Vol. 59, No. 24, an ampere-hour meter may be used to advantage in connection with this charging method, since a few experiments will determine points on the seale at which the current should be reduced to certain

values. As to the total charge ampere-hours necessary, 105 per cent, of the discharge will usually be sufficient, although this figure should be varied somewhat according to the character of the previous discharge. For a very short discharge it may be necessary to put back only 100 per cent, of the ampere-hours taken out, for an ordinary discharge, 105 per cent, is about right, while for a very long and thorough discharge 110 per cent, may be necessary, Such details as this are easily worked out when a given set of conditions is at hand. If an amperehour meter is not in use, it is possible to determine the voltages at which gassing commences with various current rates, and to reduce the current

to the next lower figure as the battery voltage rises to each of these predetermined points. Temperature and age of the battery have, of course, a slight effect on these voltage figures. Better still, the battery may be watched, and the proper reductions of current made when gassing begins.

2. Once a week (usually over Sunday) the battery is given a regular charge as outlined above, and then the low rate current continued until the voltage and specific gravity readings have risen to a maximum, and have remained there for some hours. Detailed instructions on such overcharging are given in all battery instruction books.

The weekly coercharge is a very essential part of the method and must not be omitted. The six-slay undercharging leaves in the plates a very appreciable amount of sulphate, and this must be removed once a week. Two weeks' accumulation will be harder to remove than one week's, and that of a month may be very troublesome indeed. It is useless to carry out part one of the method unless part two is also employed.

Fig. 3 illustrates the capacity variation of a thin plate battery when charged in this manner. Each daily undercharge reduces the capacity somewhat, but it rises again to its full value immediately following the Sunday overcharge. It will be noted that ordinary service requires only about 80 per cent, of the full battery capacity, and that at no time does the decrease, due to the undercharge, bring the capacity dangerously close to that required. In fact a rather wide margin is always left for bad weather and extraordinary trips. With thick plate batteries, the full capacity of which is required in each day's service, it is somewhat harder to apply the method. It should not be thought that the method is an experiment. It has been tried very thoroughly in actual service, and always with remarkable increases in battery life. The number of converts to it is increasing every day, and we have yet to hear of any one's abandoning it after once putting it into effect. Try it yourself.

ENORMOUS GROWTH. CENSUS FIGURES SHOW

IT MUST be admitted that the detailed report of the 13th census of the United States, insofar as it concerns the automobile industry, hardly sets forth the present status of the commercial vehicle end of the in-

ported. In 1904 the total number, including automobiles made by concerns classified under other industries, was 22,830, while in 1909 the number was 127,287, or nearly 33 times that reported in 1899.

	Gar	soline	E	lectric	8	team	Tol	nls
	No.	Value		Value	No.	Value	No.	Value
Bugnice-								
1904								
1909	4.314	\$2,039,129	26×	\$352,121			4.5 % 2	\$2,391,250
Hanabouts								
1904	10,999	7,976,821	455	452,304	677	\$401,379	12.131	8,831,504
1909	35,347	27,116,901	496	648,639	361	264,948	36,304	2×,030,475
Touring Cars-								
1904	6,444	10,576,023	39	55,43%	737	1.150.460	7,220	11,751,521
1969,	73,413	109,844,295	243	357,526	1988	3,171,367	76,114	113,403,1NF
Closed Cars-								
1994	•			•				
1969	3,290	8,762,768	1915	3,966,536			5,265	12,729,304
Omulhases, Etc								
1904	1,061	1,311,253	717	747,810	152	132,199	1,930	2,191,262
1909		1,767,139	409	674,015	25	13,926	1,233	2.4h5,0hr
Total Passenger Vehicl								
1904		19,300,654	1211	1,819,595	1566	1,684,038	21.2%1	22,804,287
1909	117,633	149,530,232	3331	6,625,525	2374	3,480,241	123,338	159,039,301
Delivery Wagons-								
1904	140	215,997	109	235,560	2	4,000	251	455,457
1969	1,645	1,474,663	217	441,793			1.562	1,918,856
Trucks-								
1904	55	50,390	105	441,100			160	491,496
1909	1,090	2,384,703	276	740,809			1,366	3,165,512
All Others-								
1904								
1969	25	140,655	2	5,000			27	145,651
Total Business Vehicle								
1904		266,287	214	676,660	2	4,000	411	946,94
1949	2,760	3,999,421	495	1,230,602			3.255	5,230,02
Total Automobiles-								
1904	18,699	19,566,941	1425	2,496,255	1565	1,688,938	21.692	23.751.23
1909	120.393	153,529,653	3>26	7,259,430	2374	3,480,241	126,593	164,269,32

dustry. The figures were compiled in 1909 and the growth in the manufacture of business automobiles has been quite as rapid, if not more so, than during the five years covered by the report.

However, the figures are of interest, particularly as they set forth that the increase in the entire industry was 729.7 per cent, in value of products, and 528.4 per cent, in average number of wage earners employed, This places it at the head of the list, its nearest competitor having an increase of 357 per cent, in value of products and 297.3 in number of wage earners.

Even the director of census is forced to remark: "The growth of the automobile industry has been phenomenal." In 1899 the general statistics for the industry were included with those for carriage and wagon manufacture, and only 3897 automobiles were re-

The value of all products of the industry proper was \$249,202,075 in 1909 and \$30,033,536 in 1904. Gasoline machines formed 95.1 per cent, of the total mimber made in 1909 and 86,2 per cent, in 1904. Of the total number manufactured in 1909, 3226 or 2.5 per cent. were rated at 50 horsepower or more; 51,218, or 40.5 per cent., at from 30 to 49; 35,257, or 27.8 per cent., from 20 to 29; 29,353, or 23.2 per cent., from 10 to 19, and 7539, or 6 per cent., at less than 10. Passenger vehicles constituted 97.4 per cent, of the total number and business vehicles, 2.6 per cent.

Two large passenger pay-as-you-enter buses, made by the Lauth-Juergens Motor Car Company, Fremont, O., have been put in service between Duluth and Proctor, Minn., and Bryan and Defiance, O.

ELECTRIG MOTOR CAR MART FOR NEW YORK.

By Arthur Williams.

A GOOD deal of interest has been roused by the proposition now under consideration to establish an electric motor vehicle mart in New York City. The suggestion is a novel one in that what is intended is not a group of offices of electric manufacturers who have been persuaded to take quarters in a single building, but a co-operative showroom, so to speak—a number of huge showrooms, in fact, in which vehicles of different makes are exhibited side by side, without discrimination for or acainst.

This idea was promulgated at the meeting of people interested in the electric car which was held Sept. 5 for the organization of the New York Electric Vehicle Association. The purpose of the association is to bring together in common interest manufacturers and owners of electric motor vehicles, makers of storage batteries, of electric motor car equipment, and of electrical current in New York City. The new organization will not interfere with the national electric vehicle association, but locally, anyway, will do some things which the national body hardly undertakes.

Besides the establishment of an electric vehicle mart, it is proposed to do some wholly novel work. For instance, the efficiency and economy of the storage battery, its reliability and convenience are to be made understood. So many contradictory things have been said about the storage battery, and so many announcements of new types of it have turned out to be premature, that the public mind is more or less confused, and is accustomed to think of the storage battery as something that would be great if it only could be depended upon. The degree of perfection that has been attained is not at all realized, and the New York Electric Vehicle Association purposes bringing the facts home so that this neglected power agency will come into its own.

One of the association's ideas which indicates a line of progress that must be followed by more and more businesses in the future, it would seem, is the establishment of facilities for keeping storage battery equipment always in the best of working order, regardless of the usual selfish consideration of who made it. The plan is to employ experts who do not represent any particular company or individuals, but are at the service of the entire electric car industry and of any owner of an electric.

In other ways also the manufacturers will be brought into closer co-operation for advancing the general interests of electric automobiles.

The used car problem will be given serious consideration for one thing. It is intended that the proposed electric vehicle mart—for which a satisfactory location is already being sought—shall be of service to this end. The charging question, which made so many difficulties for electrics in the earlier days, will be helped toward solution by compiling and publishing in some form, for the use of owners, a list of charging garages.

which possess the proper electrical facilities.

Arthur Williams of the New York Edison Company, who is the prime mover in the new organization, presented a suggestion which will doubtless be adopted with enthusiasm, the more so because it provides for taking care of a need which every owner or operator of any kind of an automobile has long felt: the need of accurate, thoroughly reliable information as to roads, routes, garages and charging stations in the vicinity of New York City.

While the New York Electric Vehicle Association will welcome members from any part of the country, its executive management will be controlled, not to say confined, in New York City. There will be a permanent salaried secretary whose services will always be at the command of any member. What the organizers of the association emphasized most strongly at their first meeting was the principle of not showing the least prejudice, but working all the time for a common good.

The officers of the organization are the following: President, Arthur Williams, New York Edison Company; vice president, William P. Kennedy, Baker Motor Vehicle Company; directors, E. W. Curtis, Jr., General Vehicle Company; E. W. Menefee, Anderson Electric Car Company; Nathaniel Platt, Baker Motor Vehicle Company; C. Y. Kenworthy, Rauch & Lang Carriage Company; M. G. Macdonald, R-C-H Corporation; W. R. Chandler, Flanders Manufacturing Company: George H. Phelps, Studebaker Corporation: V. A. Villar, Champion Wagon Company; John H. Kennard, Couple-Gear Freight-Wheel Company of New York; W. L. Case, Lansden Company; Charles A. Ward, Ward Motor Vehicle Company; A. B. Roeder, Fritchie Automobile and Battery Company; executive committee, Nathaniel Platt, C. Y. Kenworthy, S. W. Menefee and V. A. Villar,

The officers are now considering a proposition for permanent location in a building centrally located, of sufficient proportions to meet all of the anticipated requirements, which the owners are ready to lease on a basis that is regarded as reasonable. It is suggested that this structure, should it be chosen for the mart, shall have on the first or ground floor a garage. On the second shall be the showroom, on the third the salesrooms, and the upper floors shall be occupied by the offices of the different companies interested in the mart. It is believed that this concentration of interests should attract nearly all of those engaged in the industry or representing the different manufacturers.

The association's educational efforts will be twofold. Frequent meetings are to be held in order that the members may become better acquainted and may co-operate more closely in what is being done; and a vigorous and extensive advertising campaign will be conducted for the instruction of the public.

THE ELECTRIC VEHICLE AND RETAILER.

By Adrian S. Stevenson.

EARNED commissioners inform us that the small merchant, particularly the butcher, grocer, baker, have reached a crisis. We are told he is too many and makes too little; that he must progress or drop out. He in turn admits it, but knowing no way out must hang on till he is engulfed. What to do is the question, He is up against the powerful chain store system, to say nothing of the huge department stores. To increase prices is out of the question. To consolidate or combine is possible, but this requires considerable capital and few are able or have the executive ability to do it. The only other resort left is to increase business at the old stand without increasing expense. How then may this be done? One thing is certain; if the mountain won't come to Mahomet-to the mountain he must go.

Leaving the abstract and getting down to the con-

Let us look to facts. In June, 1911, Zampieri Bros., French bakers of New York, were persuaded much against their will to invest in a 750-pound electric wagon. It was a bold step for them, but knowing the disease and its consequences they took a chance. The machine was cared for in an old wagon shed and charged from a small panel set close to the wall. In the first nine months this vehicle averaged over 1200 miles per month, making from 40 to 100 stops per day. The cost of current was 44.9 cents per day. Investigation developed the fact that this small machine produced 25 per cent, of new business on its regular ronte, At the end of the nine months this firm ordered a 1000pound electric wagon to further its prosperity and three months later another of 1000-pound capacity, Located neaf Canal street on the East side this firm has no monopoly on trade or choice of enstomers. Now,



Six of the General Arbiele Delivery Wagons in the Service of the Boston Branch Grocery, Hartford, Cono., a Concern That Han Materially Increased Ita Basinesa by Special Deliveries.

crete we find the small dealer the victim of a disease largely of his own making. He suffers because he confines himself to a too limited and much overworked field. The time was when horseflesh was cheap enough so that every little store could maintain a conple of nags and cover quite some distance. That day has gone. The horse is today expensive and inefficient when the limit of his radius is considered. To send a horse a mile to deliver a rush order amounting in value to 50 cents is out of it, and hence the retail butcher, baker and grocer often contents himself with enstomers within five or six blocks. When a customer moves a mile or two away his trade goes with him, Possibly a new family moves in to replace the old one, but the trade of the new people may go to a competitor. Knowing the disease why not remove it root and branch? The cure is certain and sure and no merchant is too small or too poor to afford it. Where there is a will there is a way.

however, it is simply not affected by distance or weather. The milk in the cocoanut is simply this— Zampieri Bros, are in Harlem, the Broux or Brooklyn, or any part of New York, just as effectively as though they had branches located in those places and their overhead expense has increased but little. Their electrics give them in effect the results of a chain of stores, but without any increase in rent or plant. When customers move the electric moves along and serves them. Other cases and cures there are by the hundred, but this one just referred to was a supreme test amongst a class of people who are known to trade on small margin.

The fly in the ointment at the present stage of the game is that very often the investment in a truck amounts to as much as the small dealer's investment in his store. When, however, he is brought to see that a truck is as good as a couple of branch stores, that he won't lose, his enstoners though they move several

miles away, and that his delivery costs decrease as his business grows, he will forget the question of first cost and look into the situation as he should. What has been said about the small retailer applies equally well to the larger and more powerful dealers.

In October, 1910, the Boston Branch Grocery in Hartford, Comp. purchased its first 1000-pound electric wagon. In July, 1911, it purchased four more and at present has four more in order to be delivered in September and October, 1912, making nine in all. This firm's boast is that it delivers anywhere, any time in any weather, and it does. The firm has a class of trade that uses the telephone, and during the horse era it was necessary to restrict deliveries to certain times of the day on fixed routes. If, therefore, an order came after the regular wagon had starred it was held till the next trip. Now, however, orders are filled regardless of time or distance. This doesn't mean that system is not used, it means the system is flexible enough to



General Vehicle Delivery Wagon 1 and by Zampled Brothers, New York City, Baker, to Expand Its Business.

catch all the business there is and what is most important, at a profit.

The largest contributing factor to the success of the electric vehicle in retail delivery service is its extreme simplicity of operation and maintenance. This combined with its long life and reliability make it the ideal power wagon for the retail trade

Gramm Proves More Efficient—II. A. Winheim recently purchased a three-ton Gramm truck, made by the Gramm Motor Truck Company. Lima, O., which he has adapted to use on his truck farm near St. Louis, Mo. The daily haul is 20 miles and formerly several two-horse teams had to work a full day to accomplish the round trip. The truck performs the task in much less time, getting the produce to market in fresher condition and proving more efficient in every particular. The total cost of upkeep and operation has been far less than that of the horses and wagons formerly in service.

"HOT WEATHERISMS,"

General Vehicle Company Uses Temperature Changes as Argument for Its Product.

"Hot Weatherisms" is the title of a booklet issued by the General Vehicle Company, Long Island City, N. Y., that is devoted to statements concerning the efficiency of the electric wagon during hot weather. It deals with the lessende efficiency of horse haulage during the days when the temperature is excessive and points out that the electric is not only equally as efficient, but by the use of spare batteries it can be worked 24 hours a day, a reserve utility that is especially desirable for those whose service is increased largely with the heat.

It is also maintained that when the demand is increased three or four times the need is most urgent for the profits are certain of realization, and that no delivcry that has not a large reserve can be depended upon to obtain the fullest benefit of the emergency business.

WOULD BOND DRIVERS

Motor Truck Club of New York City Finds the Prob-

At a recent meeting of the Motor Truck Club, New York, it was agreed that about 75 per cent, of the success or failure attending the use of a motor truck depends upon the driver. That the driver of a commercial motor vehicle is a very important factor is pretty well understood, but that three-quarters of its success depends upon him was somewhat of a remarkable statement.

The discussion covered all phases of the problem of truck drivers, and methods of securing the best service. Instruction in best routes rather than shortest ones was deemted necessary to efficiency and the question of bonding drivers was taken up, the only advantage in this being apparently that of securing a better type of driver as only those of good character are supposed to be able to secure bonds.

It was shown that in one installation of 40 trucks a saving of 41 per cent, in operating and maintenance had been effected by arranging three classes for the drivers, each differing by \$2 a week in salary and grading the drivers according to a set maximm limit for each class on the cost of running and keeping up their vehicles.

Federal Meets with Success—During one week the Federal Motor Truck Company, Detroit, maker of the Federal Motoks, received orders for 295 trucks from Martin L. Pulcher. When the Federal truck companies now in course of organization at St. Louis and Kansas City are completed, 200 more trucks will be added to the week's list. The company has had a rush of orders and is preparing for an output for 1913 of 1500 trucks, which number may be increased to 2500.

STORAGE BATTERY CHARGING PANELS.

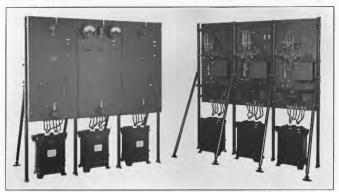
By Daniel S. Carpenter.

INVESTMENT in charging apparatus proportional to the business done is one of the many advantages to be gained by installing mercury are rectifiers in garages for battery charging. As many units as are needed to take care of the actual business being done may be installed at first and other units added as needed to take care of the increase in business. By installing rectifier panels the garage owner is not compelled to make a heavy investment in a large charging set to take care of the increased business which he expects to have at some future date, and which set, for the present, must operate at a reduced efficiency due to being only partially loaded.

In the average public garage the batteries to be

panel, and a rectifier panel, the rectifier having a range of voltage of from 45 to 230 volts direct current when operated from a 220-volt, 60-eyele, alternating current supply. The rectifier panel is supplied with voltmeter and ammeter for indicating the direct current output, with a circuit breaker and also with a double regulating dial switch having 17 contact buttons, six of which are connected to rough regulation and 11 to fine regulation taps on what is termed a "regulating compensator," thus permitting a wide range of alternating current voltage across the rectifier tube and consequently a wide range of voltage from the direct current side of the rectifier.

The public garage type of rectifier will charge as



Front View of Commercial Vehicle Type Rectifier.

charged may vary from a 24-cell to a 44-cell one, rendering it exceedingly inefficient to charge them by means of multiple circuits with a rheostat in each circuit as the losses in the rheostats in the circuits with the smaller batteries would be excessive.

Charging of Pleasure and Commercial Vehicles.

Many garages are equipped with the so-called "public garage type rectifier" which embodies a method of series-multiple charging whereby the batteries are so arranged as to get the proper equalization of charging voltage on the series groups, thus practically eliminating the loss in rheostats.

The public garage type of rectifier consists of two panels, a feeder, or distributing panel which controls the charging circuits and is so designed that the series and the series-multiple connections are made on the

Rear View of Commercial Vehicle Type Rectifier.

many as 90 cells in series, or 180 cells when connected in series-multiple, and when properly handled is undoubtedly the most efficient method of charging batteries in a garage.

Garage Charging of Vehicles for Delivery Service.

The "commercial vehicle type rectifier" is designed particularly for installation in the garages of department stores, express companies and other concerns maintaining electric delivery service where all the batteries have approximately the same number of cells and the same ampere charging rate. It is designed for charging a 40-44 cell lead plate battery, or a 60-cell Edison battery at a 30-50 ampere rate, and is for operation on an alternating current circuit having a potential of 220 volts and a frequency of from 25 to 60 cycles.

The instrument panel is equipped with high grade

direct current ammeter and voltmeter. On each panel there is a double pole potential receptacle, one side of which is connected to the voltmeter on a panel provided with instruments, and the other side to the direct current terminals of the rectifier panel on which the receptacle is mounted. Hence, if the voltmeter plug is inserted in any receptacle, the voltmeter will indicate the voltage on the corresponding rectifier and battery under charge from that panel. A spring switch arrangement also permits connecting the ammeter on the instrument panel in the circuit of other rectifiers wired to the switching arrangement so that a number of panels can be installed and so wired that the charging current and voltage of any panel in the group can be readily determined when only one of the panels is provided with instruments. For this reason the panel is made in two designs, with instruments and without

Front and Benr Views of a Single Phase Mercury Arc Rectifier Garage Outfit, Equipped with Sub-Base.

them. As each rectifier is a complete unit, a charging outfit may be installed, which will consist, at the outset, of a single rectifier panel with instruments, and panels without instruments may be added as the increased business makes it necessary.

The efficiency of one of these sets will be between 75 and 80 per cent, and the power factor, which will depend upon the amount of regulating reactance in circuit, will vary from 70 to 90 per cent.

cuit, will vary from 70 to 90 per cent.

These rectifiers are manufactured by the General Electric Company, Schenectady, X. Y.

Big Order for G. V. Trucks—The General Vehicle Company, Long Island City, N. Y., is now building for the Adams Express Company an order of 17 trucks, which are to be sent to different cities for regular service as soon as delivered.

MOVING BY WHITE TRUCK.

Ability to Compete with Railroads in This Field Ably Demonstrated in Connecticut.

That the motor truck is destined to supersede the railroad in the transportation of certain goods was demonstrated recently when the three-ton White truck, made by the White Company, Cleveland, O., and owned by Fred W. Wolven, engaged in the general moving and furniture business at New Haven, Conn., carried a load of furniture for Thomas O'Connor of Westville, Conn., to his new home in Arlington, N. I.

Mr. Wolven has been using the car on long haul work since its purchase a short time since, but the New Jersey trip was by far the longest he has taken

and was essentially an experiment to learn the capabilities of the vehicle. The start from Westville was made at 5:30 in the morning, the chauffeur driving to New York, crossing into Jersey on the ferries, thence to Arlington, where the load was delivered and returning to the White company's service station at New York City, where he arrived at 5 in the afternoon. The return trip to New Haven was made the next morning.

The total amount of gasine consumed was 15 gallons, and in discussing the trip Mr. Wolven said: "I had more furniture on the truck than I could have put on two of my large horse vans. I purchased the White truck a few weeks ago and I have found that it does the work of five horses and two vans. That of course

cuts down the salary of one driver and also eliminates the expense of keeping the horses, while the cost of operating the automobile is very low."

Brewers' Truck at Convention—One of the Benz-Gagenau six-ton trucks owned by Peter Doelger, New York brewer, and in charge of Bruno Kayser of the Benz-Gagenau truck department, left New York recently for Boston, where the Boston Brewers' convention was held. Six of these trucks have been operated over a daily mileage of ### 0 to 100, and Mr. Doelger has contracted for six more of the Benz-Gagenau chassis. In Boston the truck was demonstrated for the members of the brewers' convention and before returning to New York will make a tour of the Xew England States, which will cover a total distance of some 1200 miles.

Estimated

COST OF ELECTRIC CURRENT.

Some Interesting Figures Based on Results Obtained from Actual Experience.

Those who are not informed are inclined to believe that the cost of current necessary to charge vehicle batteries is excessive, but when the actual requirements are known it will be seen that the expense is comparatively small. It should be understood that a battery is seldom exhausted, and whatever energy remains is added to and the charge brought up to its maximum efficiency. In this connection some very interesting figures are presented which are based on actual experience and can be regarded as in every way dependable. The tables are founded on the assumption of 300 working days in the year:

Max. Demand KWH, Type of vehicle. Full Charge.	Estimated Av. Annual De- mand, KWH.	Annual Demand KWH, Maximum
Five-ton truck39.5	8,300	11,85
3.5-ton truck	7,200	9,90
Two-ton truck 26.3	8,500	7.89
2000-pound wagon 19.8	3,800	5,94
1000-pound wagon 16.8	3,100	5,04
750-pound wagon 13.2	2,300	3,96

Considering the cost of current to be four cents the kilowatt-hour, and taking the average demand and the maximum demand for current the cost for each type of vehicle is found to be approximately as follows:

	Average		Maximum	
	Annual	Annual	Annual	Annual
Type of vehicle,	Mileage.	Cost.	Mileage.	Cost.
Pive-ton truck	7,200	\$332	10,500	\$474.00
3.5-ton truck	8,310	248	12,000	396.00
Two-ton truck	9,390	220	12,500	315,66
2000-pound wagon1	0.140	152	13,500	237,60
1000-pound wagon1	0.500	124	13,500	221.66
750-pound wagon1		92	13.500	158.46

Taking the average mileage and the annual cost for current the following results are found:

	Average	Cost a
Type of vehicle,	Annual Mileage.	Mile, Cents
Five-ton truck	7,200	4.61
3.5-1on truck	8.310	3.46
Two-ton truck	9,390	2,34
2000-pound wagon	10,140	1.49
1660-pound wagon	10,500	1.18
750-pound wagon	10,620	0.88

BUFFALO COMPANY'S ACTIVITIES.

Babcock Plant to Be Devoted to the Exclusive Production of Service Vehicles.

The Buffalo Electric Vehicle Company, Buffalo, N. Y., which was formed by the consolidation of the Bab-cock Electric Carriage Company and the Van Wag-oner Electric Vehicle Company, proposes to specialize the production of delivery wagons and service vehicles, and will give over the entire Babcock plant in West Utica street to the building of these machines. The factory is large and well equipped and it is expected that the output will be to its capacity as soon as the plans of the company have been determined.

The company has acquired a building at Main and Parker streets of large proportions, the upper floors of which will be devoted to the manufacture of pleasure cars, and the lower floor will be made a salestroom for all types of vehicles. The salestroom is large, having a frontage of 75 feet in Main street, and it is well lighted. It is now being fitted for the uses of the company.

NEW G. M. C. CATALOGUE.

Interesting Booklet Devoted to Description of Electric Models Made by This Company.

The General Motors Truck Company, Pontiac, Mich., has issued a booklet known as Catalogue No. 105, which is devoted to description, both general and specific, of the G. M. C. electric wagons and trucks. The booklet has been prepared with extreme care with a view of affording to any person interested practically all of the data that could be desired, and it covers in detail every type produced by the maker. Besides this information it considers operation and maintenance and presents some figures that are especially interesting and convincing.

The booklet is handsomely illustrated, many of the features of construction and some of the special qualities of the design being shown. As a practical volume it has much merit. The booklet has unusual value to the power salesman or representatives of the electric light and power companies, but it is good reading for any business man.

WAVERLEYS IN LIGHTING SERVICE.

Louisville Concern Equips Trouble Men with Specially Designed Electric Roadsters.

The Louisville Lighting Company, Louisville, Ky., has purchased of the Waverley Company, Indianapolis, Ind., six Waverley electric roadsters, to be used by the trouble and the repair departments. Including the four light delivery wagons of the same make the company now has 10 Waverley machines in its service.

These roadsters have been fitted for the special service for which they are required by the installation of boxes at the rear of the seats to contain the supplies and the tools ordinarily carried. The delivery wagons will carry the larger quantities of construction material required. The order for 10 machines is unusual with the lighter type of vehicles. The roadsters are the same as the machine that was driven 1400 miles in 12 days in the Indiana cars Four-States tour last year.

Baker Trucks at Worcester, Mass.—The Worcester, Mass., brunch of the American Express Company has received the first of the Baker electric trucks that are to be used in that city and they are now in daily use. These are of two-ton capacity, a standard size with the company, and are similar to those in use in other cities. The machines are garaged at the garage of the Worcester Electric Light Company, in Faraday street.

ELECTRIC VEHICLE PRACTISE.

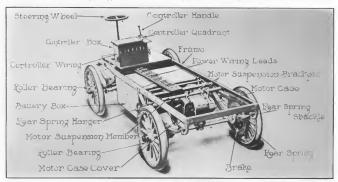
Qualities of Electrical Transports That Make for Economy of Service and Extreme Endurance—Introductory to a Specific Consideration of Their Designing, Construction, Operation, and Maintenance.

(By William W. Scott.)

In WHATEVER service it may be employed the electric power wagon possesses every quality that makes for economy. The long service that can be depended upon with anything like reasonable care and attention, is another factor that must impel the consideration of those who regard efficiency as equally as important as economy.

The electric motor driven wagon is intensely practical. In it the designer can compute each power efficiency and this computed capacity can be realized in practice. By this is meant that electrical engineering units of measurement are universal and always have the same value. Any result can be established with absolute exactness. Nothing is approximated. This The electric wagon is generally standardized. With practically every make now offered in the market the batteries and the motors are standard productions, and while the methods of ntilizing the power may differ, and differ materially in some instances, the machines are built to designs that are seldom varied and will be continued for indefinite periods. Some of the best known buildlers have but one design and build perhaps a half dozen sizes, this being the ideal of standardization, and when vehicles are so produced it will be realized there is every reason why there should be no change.

There are limitations to the capacity of the electric wagon so far as mileage is concerned and for this rea-



Pig. 1-A Typical Electric Wagon Chassis, Seen from the Renr, Illustrating Some of the Components.

applies to every use of electric energy, and it will be understood that there is no variance with reference to the electric conveyance.

The electric wagon is designed and constructed to principles that have been established as mechanically correct. It is singularly free from weaknesses, and it has qualities that insure unusually long endurance. The longevity of any machine depends to a large estent upon the use made of it, but there are electric wagons in daily service in New York that have been in operation more than 12 years, and these are of types that were crude as compared with the perfected constructions of today.

son there are works that cannot be as economically performed as with other forms of vehicles, this applying particularly to long hauls, but the range of capacity is from 35 miles with the heavy trucks to 50 miles with the light wagons on a single battery clarge. By the use of spare batteries these mileages may be doubled, but battery changing is not practical in a straightaway haul, so it may be said that the radius of movement of the electric machine is an outward haul of half the battery mileage, and return. It is possible to materially increase the utility of a vehicle by giving the battery a "boost" or partial charge, and long distances have been covered by machines that have been so charged.

There is no question, however, that the capacity of storage batteries will be materially increased. During the past five years remarkable progress has been made in their development, and not only has weight been reduced, but capacity has been increased, a two-fold gain. And in addition to this the life of the batteries has been prolonged, so that it will be understood that from every point of view progression has been made. It is apparent that with these successes there is every reason to expect the battery builders will continue their endeavors to add to the efficiency of the wagons.

As to the cost of current for charging the batteries, it may be said that the average rate for electric energy is by no means excessive. The owner who can produce current for his vehicles can no doubt lessen the expense materially, and in large installations it may be that the reduction could be as much as two-thirds of the prevailing commercial rate. Circumstances and conditions would very largely determine economy in

the consumption. The production cannot be gauged to demand and any excess over the actual requirements cannot be conserved. Where the power demands are large and the day production is much in excess of the night consumption, many central stations charge a smaller rate for current used between 6:30 in the evening and 6:30 in the morning. Divisorsly, with electric vehicles, the charging is generally done at night and at a time when the current consumption is smallest.

Practically all central stations have use for highway vehicles, and naturally a considerable number have ntilized electrics. This has impelled the installation of facilities for eharging and garaging the machines used. The experience with these wagous has impressed the managements of those enterprises with the commercial possibilities of all forms of electric transports, and has effectually denonstrated their utility and economy. Many central stations have begun to system-

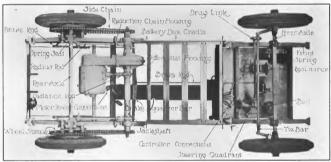


Fig. 2-Hottom View of a Standardized Electric Wagon Chasals, Showing Important Members,

private current production. Like every other utility, the electric vehicle is most economical when used in numbers, and the cost is usually proportionately lessened as the number is increased.

Sources for Charging Service.

As the one thought of those who are considering the use of electric vehicles is the certainty of obtaining current, it may be well to point out that in the United States today are approximately 30,000 different public service corporations that produce electric energy for power and lighting. This number is constantly increasing. Each plant has a definite capacity and current is supplied to consumers in any desired volume. Usually the energy is utilized for power during the day and for lighting at night.

At certain periods of the day, especially between midnight and 7 in the morning, and Sundays and holidays, the demand for energy is considerably less than atically promote the use of such vehicles, and some have established garages where every desired attention is given to owners who do not care to provide private garaging facilities. Such garages are usually conducted to carefully developed systems and without exception the service afforded is in every way high class and reasonable.

Central Station Garages.

From the viewpoint of the central station it is desirable that the owners of electric power wagons shall realize a standard efficiency, and usually attention is directed by expert electricians and high class vehicle men. There are many garages where electric echicles are cared for and maintained, but this service is not often specialized and is usually incidental. Exclusive electric public stations are today the exception, and this condition has impelled the establishment of garages by the central stations. There is every reason to believe that in a comparatively short time the cen-



Fig. 3—The linker Method of Steering Column Control. tral station garage will be as much a public requirement as now is the light and power service.

It is not probable that the average owner of one or several vehicles would care to establish a garage, and incun the expense incidental to its maintenance, but would rather contract for a service that would for a reasonable price insure expert attention and a continuation of efficiency. In this way he would eliminate all possibility of neglect and place himself where he would receive the benefit of every facility and convenience of the station.

Each central station and the community it serves represent a field for electric vehicles, the demand being proportionate to the stimulation given their use and the volume of business transacted. As a business proposition the stations will no doubt be impelled to cooperate in whatever will add to their revenue, and this means not only promotion of the electric vehicle, but the establishment of such facilities as will insure a full realization of their utility.

No Mystery About the Electric Wagon.

There is nothing mysterious about the electric wagon. Aside from the chassis running gear its chief

components are the motor, battery and controller, While it is true that a person considering such a vehicle may know nothing of these elements, it is also true that at every hand is abundant demonstration of the cificiency of them all. Millions of motors are in daily use and in every form of service. They are regarded as the most economical form of prime mover. No more severe or exacting work could be conceived than driving electric trains and street cars, and the world over motors of the same design as are used for electric wagons are used for railroad propulsion. Every person knows how reliable and enduring these railroad motors are. Regarded from any viewpoint the motor represents the highest mechanical efficiency. The controller of the electric wagon is also of the same type used with street and railroad cars. As both motor and controller have been developed through an experience of more than a score of years there is no reason to believe that these standard products are any the less reliable when used in wagons. At all events both motors and controllers are sufficient for railroad service.

The motors are built by the largest concerns of the kind in the world. They represent the most advanced engineering and the highest workmanship, being designed to have extreme endurrance and yield the most economical service. The materials are determined with great care and there is a wide margin of safety with every component. The motors are encased and protected from every influence that might cause deterioration. The parts are interchangable for each type and can be obtained at short notice and at comparatively small expense. Being produced in large numbers the cost of the motors is relatively low. There is no probability of cessation of manufacture.

The simplicity of the motor may be puzzling to the tunnechanical mind. Because the injunction of the builder is to keep it clean and oiled, and there are practically no adjustments or attention required, one not well informed may believe that only an expert can

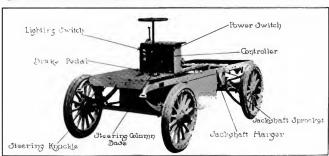


Fig. 4-Three-Quarters View of an Electric Chassis, Indicating Position of Control Members.

operate and maintain a motor. As a matter of fact the machine is well nigh fool proof and it is constructed to run for months with lubrication and cleaning. As there are but two bearings to oil, and ordinarily the cleaning is confued to whigh the commutator with a cloth into which a little clean vaseline has been rubbed, with an occasional adjustment of the brushes, it will be understood that the real mystery of a motor is that it is so simple. If work is required this is usually of an inexpensive character.

The attention required by the controller is practically confined to cleaning, oiling and slight adjustments for wear and are correspondingly simple.

Storage or secondary batteries are constructed with extreme care and have capacities that can be determined with great exactness. They are the products of concerns that have the service of engineers of wide exreserve is always available. The certainty of the power of the electric wagon is abundantly demonstrated in service; especially in work where large loads are constantly carried, and trucks are built that have a capacity of seven tons, the manufacturers having no hesitancy in guaranteeing them.

Electric vehicles are limited as to speed. The limit is usually 12 miles for the light types and seven miles for the heavy trucks. They cannot be driven to extremes by careless or reckless drivers and the motors cannot be abused.

The handling of the electric wagon is simple from every standpoint. The man who has never before driven a machine can be trusted to drive after brief instruction. No mechanical knowledge is necessary, and it may be regarded as mudesirable, as a man who does not know will obey orders and can be trained to give

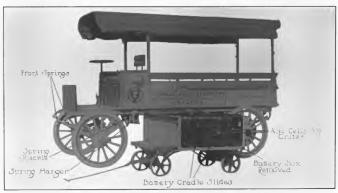


Fig. 5-Electric Wagon with Express Body, Showing Buttery Crates Removed from the Cradie,

perience and they are built to meet the requirements of constant service. The care and maintenance of batteries is not difficult and methods that have been found productive of the best results are advised for the users. Common sense must be used in charging, discharging and maintaining them, and the advice by the maker for use can always be depended upon to yield satisfactory results.

Large Reserve Power Available.

The man who is considering the electric vehicle for service should judge the capacity by the work that it can do. That is, judgment should not be based on the assumed small power of the motor. All motors have large overload capacities and they will develop temporarily from 200 to 300 per cent, more than the normal rating, but this excess power is never developed unless it is needed. This is an elasticity in which the exactly the care and attention that is essential, while a man who assumes knowledge might by his ignorance, carelessness or neglect cause some damage. A man may be taken from a horse vehicle and broken in to drive in a short space of time, as his experience in road and traffic enstoms and rules and familiarity with the streets and roads is especially desirable. Not only this, but the man who is accustomed to horses is not inclined to drive carelessly.

Ed. Note—This is Part 1 of a work that will conside the electric vehicle in practise from every point of view. It will continue in succeeding numbers of MOTOR TRUCK and will be comprehensive in detail and illustration. Part II will deal with Electric Vehiele Development. NO. 10.



vol. III

OCTOBER 1912

AUTOMOBILE JOURNAL PUBLISHING COMPANY Times Bidg., Pawtucket, R. I. William H. Binck, Trensurer. D. O. Binck, Jr., Secretary,

Publishers of THE AUTOMOBILE JOURNAL THE ACCESSORY AND GARAGE JOURNAL Phone Pawtacket 1000.

EDITORIAL DEPARTMENTS

CARL A. PRENCH. C. P. SHATTUCK. WILLIAM W. SCOTT.

ADVERTISING DEPARTMENTS

New England-John W. Queen, 6 Bencon Street, Boston, Mann, Central States-

W. R. Blodgett, 25 West 42nd Street New York City. Phone Brynnt 3728.

Western Sintes-

G. A. Eldredge, 304 Sun Bullding, Detrait, Mich. 'Phane Cherry 2240, P. G. Luriun, 4707 Magnotia Ave., Chicago, Ill.

PUBLISHED THE PIRST OF PACH MONTH.

SUBSCRIPTIONS:

The United States and Mexico, the year, \$1 in advance: Can-

ada and Foreign Countries in Postal Union, the year, \$2 in advance. Fifteen cents the copy,

ADVERTISING RATES.

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding. Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal appara-tus, the motor industry and the trade, will receive atten-Stamps must be enclosed to insure return of unsoilcited contributions.

Entered as second class matter, February 25, 1911, at the Postoffice at Pawtucket, R. L. under the Act of March 3rd, 1879.

ELECTRIC VEHICLE EXHIBITIONS.

The exhibitions of electric vehicles, electric vehicle and electric garage equipment, made in connection with the electrical shows held in Boston Sept. 28-Oct. 26, and in New York Oct. 9-19, have unusual interest to the business world. There are purposes for which such machines have particular qualities, and demonstrations for years have proven their practical utility within specified limitations. Electric current is supplied commercially for nearly 30,000 different commercial centres, and each central station has, or can have, such facilities as are necessary for vehicle battery charging. Besides these, thousands of concerns produce electric energy that may be utilized at comparatively small expenditure.

The scientific production of standardized components has placed at the command of electric vehicle builders absolutely dependable parts, and development work is progressing with a view of increasing capacity, insuring greater economy, and placing in the market machines that have extremely long life.

Electric transports have been tested for years with surprising results as to endurance. In New York wagons and trucks now in service have been used 12 years and promise to serve for a considerable period. Used with other forms of transportation they have been equal to all expectations and have given satisfaction.

These exhibitions are intended to bring to the attention of the business world the different forms of wagons and trucks, the designs, constructions, materials, workmanship, capacities, body equipment and loading space, and the details of the motors, batteries. controllers and instruments necessary in their operation. Besides, it is intended to afford opportunity for observation of vehicles in actual use. At the Boston show a garage in the building gives a regular service to machines owned by concerns in different businesses, and demonstrates the attention and care necessary to maintain them in condition for constant

In practically all motor vehicle shows of the past electric machines have been subordinated by the innumerable exhibits, and the displays have been made by a few manufacturers, there being no general showing by the industry. In the exhibitions referred to nearly all makers of industrial vehicles and many pleasure car builders have representation, all displaying the latest and best of their products. shows have been widely exploited and it is expected that the electrics will be seen by hundreds of thousands of visitors. The fact that the machines are shown in large numbers and under circumstances which will direct special attention to them should be decidedly promotive and impel investigation of the vehicles that ought to be productive of large and favorable results.

CARE OF POWER WAGON TIRES.

There appears to be every reason why a garage or public station that is giving regular service for power wagons should give careful attention to the tires of the machines. This is not a reflection upon those who conduct such stations, but it is an emphasis that with the tire expense a considerable part of the cost of operation there should be endeavor, so far as possible, to minimize this cost. The tires of service wagons are subjected to much more severe wear than are those of pleasure vehicles, largely because the roadway cannot be selected, and the shoes are often scratched, torn and ent, in which condition they are more easily worn or damaged. There is no question that with the tires cleaned each day after use, the cuts and tears closed with plastic rubber and hardened with acid or vulcanized, there would be a large gain in tire endurance and an increased service that would amply compensate for the time required to inspect and repair the shoes. The average garage of today gives its attention to everything else than tire maintenance, this being left to the driver and owner to judge and decide, as each emergency arises.

THE MOTOR TRUCK IN ROAD BUILDING.

Tank and Spraying Installations Insure Best of Highway Work, and Economize and Increase Radius of Direct Delivery of Barrett Manufacturing Company.

EVERY man engaged in business is interested in highway improvement. He has to contribute to the cost of haulage, no matter whether or not he owns vehicles, and if he maintains his own delivery service he quickly realizes that the expense of maintenance depends largely upon the condition of the streets and roads. There are those who assume to believe that a highway, once constructed, should not deteriorate and should cost but little thereafter. There are others who understand that the improved way attracts traffic that cannot be otherwise than destructive in proportion to

While it may appear paradoxical the motor truck, which is regarded by many as being a destroyer of highways to even a greater degree than the pleasure car, would appear to be the one certain means of developing and

improving the roads of the country. There are n u merous reasons, but the principal one that may be cited is the s n b n r b a n business that will impel the delivery from the commercial centres for considerable distances and ereate a demand for road improve-

ment that cannot be denied. Pleasure car use is a matter of convenience, but business commands facilities that must be provided.

In Modern Road Construction.

Not only this, but the use of motor trucks in modern road building is as certain as in any other work where time and labor may be saved by improved methods. In highway construction motor trucks were used for hauling stone comparatively early in their development. Prior to this tractors and trailers were employed. There has been one factor, however, militating against the general adoption of trucks by contractors, this being the competitive bidding for work and the uncertainty that there will be continuous service during the period of the year when construction can be carried on. The average compactor must limit his capital investment and the fact that he can keep his outfit busy but half the year, the other half his equipment being unproductive, has been often prohibitive, That his vehicles would cost him but little while not worked is not regarded of as much importance as having the cash they would represent, and it is a fact that many contractors prefer to hire horses and carts rather than own them. Besides, it is urged that no contractor has any guarantee of work and it may be necessary to go considerable distances from one job to another.

In road construction, the excavating is slow because a great deal of it is done by hand tools, and the excavated material is hauled over rough ground. The custom is to erect the crusher as advantageously as is possible, both with reference to the supply of stone and the work, and the crushed material is hauled to the

place where the construction is in progress. As most modern emshers are so built that the wagons may be loaded by gravity. and the carts may be unloaded by dumping, it will be seen that the greater part of the time may be devoted to

hantage and travel, which



Ballery of Alco Trucks, tard for the Delivery of Tar Products by the Boston Branch of the Barrelt Manufacturing Company.

makes for economy of the time of the men.

One of the most important items of cost in truck operation in road construction is for tires, as the loose fragments of broken stone are generally sharp and are exposed, so that in driving over them constantly the surfaces of the tires are cut and scarred, especially the shoes of the traction wheels. This has been another reason why contractors have hesitated to use trucks, With other forms of tires, however, there would appear to be no reason why this expense cannot be greatby decreased.

Experience with Tarvia,

But in the hanlage of the bituminous binding material that has been very generally adopted in the construction and preservation of macadam roads the truck has been utilized with unusual success. The illustra-



Loading a Tank Truck Equipped with a Spraying Apparatus with Heated Tarvin at the Sverett, Mana, Works.

tions show the manner and methods by which the Barrett Manufacturing Company distributes its tarvia products within a radius of approximately 50 miles of the works, and delivers them ready for application. This form of delivery is something decidedly out of the ordinary and it demonstrates the fact that any municipality that maintains its own streets and roads can own its equipment and do its work with a large measure of economy.

When tarvia was first produced by this company but one grade was manufactured, which was prepared at the works at Everett, Mass., in barrels and hauled to the work by wagons or carts. It was necessary to heat this in large kettles at the roadside, and it was applied with dippers or coal hods while hot. As it cooled it was covered with stone screenings and was rolled. It will be understood that this form of road treatment was economical, but a considerable part

of the expense was the handling of the material, not its actual eost. There was a decided merit to the result of the application from many points of view, but later another product was manufactured, the original being designated as tarvia A and the second as tarvia B. Tarvia B was intended for use as a surface binder and dust suppressor, it being of a fluid character that eliminated heating, so that it could be applied cold to the road. It has a moderate quality of penetration. and is recommended chiefly for preservation of existing roads, and not for new construction, The third product is known as tarvia X, and is a heavier and

more substantial material, being without fluidity when cold. It is necessary to heat this for application, and generally it is mixed with the crushed stone and used to bind the entire upper course instead of the surface.

The problem with the engineers of the Barrett Manufacturing Company was to economically apply these products, and for tarvia A it seemed probable that no better method than has been described could be employed without special apparatus. Tarvia B was of a consistency that made practical the use of tank wagons and hose, for it was found that with the diminintion of the gravity

head in the tanks the fluid could not be equally applied without means of specially directing it upon the road surface. Tarvia X could only be used when heated to a comparatively high temperature, and it was necessary to apply it with such fluidity as to insure adhesion to the stone.

Devices for Spraying.

Different forms of tar spraying machines were used abroad and the Massachusetts state highway commission imported two forms of apparatus, and the Barrett Manufacturing Company one, but these were found to be impracticable for use because of the general conditions under which roads are constructed in this country and they were not equal to the requirements. When disabled the delay for parts and the excessive cost of special work done in this country practically prohibited their use. Then the Barrett Manufacturing Company began experiments to provide



On the Road: These Trucks Have Delivered Tarvia at a Temperature for Application, at Points 50 Miles Distant from the Works.



Truck Equipped with Power Spraying Apparatus Applying the Heated Tarvia to a Road Surface at a Rate of 1000 tiations in 75 Minutes.

equipment that would meet all the requirements and still endure. First of all the tarvia A was heated to a high temperature at the works at Everett and was hauled over the road by horses. This worked out well within distances where the time for haulage was such the material would not cool so it could not be applied. As this necessarily limited the radius for delivery the service the company could give was restricted. To extend this was the next endeavor.

Then tank wagons were experimented with, and it was found that by hauling these to the work within any distance in which it was practical to work animals, the tanks could be hauled by steam rollers with hose connections between the boilers and the tanks through which steam could be utilized to heat the tarvia, and temperature and pressure maintained. This equipment was found to work out well from every point of view, but there was the limitation of the forses to be

considered. As the tanks contained from 800 to 1000 gallons to hard these 20 miles was as large a day's work as any horses could reasonably be given. The time taken necessarily probonged the use of the tanks, which were needed all the time work could be continued, and there was much used; and the time work could be continued; and there was much much and difference to the conditions.

Tarvia can only be applied when a road is dry and if a haul were made and a storm developed during the time of haulage this necessitated a delay of the tanks until the road had been dried. All of this added to the expense of delivery and the cost was borne by the company. Quick transportation was absolutely essential because of the demand for products during time when work could be performed, and because there was a limit to the delivery equipment that could be maintained. It was also found that there were numerous emergency calls, where a work was held up from lack of material, to illustrate.

Success with Alco Truck.

The company then turned to motor vehicles. The first in stallation was merely a 1000gallon tank mounted on a chassis, the tank being filled with heated tarvia and sent over the road to the work, de-

pendence being placed entirely upon the use of the steam supplied by a steam roller, the truck being hauled by the roller during the period of This was found to be a mateapplication. rial saying in time and to insure a large degree of economy as compared with horses. But as the truck could be sent a distance of 25 or 30 miles with comparatively little reduction in the temperature of the tarvia, and it could be applied with small loss of time, it was believed that by the use of a pumping apparatus to maintain a pressure in the tank applications could be still more economically made. The first truck was used last season, this being a five-ton Alco, and it was worked through the year with decided success, for tarvia X was delivered hot, at a temperature to be applied to the roads, at points as far distant as Plymouth, Mass., and Central Falls, R. I., these being approximately 50 miles from the Everett works.



Applying Tarrin X from a Tank Truck Hanied by a Road Roller, Which Furnishes Stram to Heat the Material and Affords Saltable Pressure.

The truck was utilized with a steam roller with tarvia X and under ordinary circumstances the tank load could be applied in about an hour and a quarter. As may be assumed this was a flecided saving in time and insured a uniformity of application and a high standard of construction, factors of importance to both the company and the contractor for the work. So successful was the equipment that temporarily a three-ton Alco was also fitted with a tank and was used for long hauls for several months.

With the experience gained this season the Barrett Manufacturing Company began to extend its equipment and two more trucks were equipped for service at the Everett works, two were fitted and stationed at New York, and a fifth was sent to Montreal. All of these five trucks carry 1000-gallon tanks and all have heavy power pumps, operated by the motor engine, which will give a high pressure in the tanks and insure an even flow of tarvia from the headers at the rear. The tarvia is distributed over a strip of surface seven feet wide and in an hour and a quarter a mile of roadway can be treated, this requiring a trip in either direction. With the tarvia heated at the works the trucks can be used for delivery and application as well, which is a large saving as compared with horse haulage for any distance beyond 10 miles, and a decided economy in the road treatment because of the work being done by experienced men and having a uniformity that insures endurance; as contrasted with horse haulage and hand work in the use of tarvia there is even a greater saving.

Although the trucks were installed primarily with a view of developing business not possible with horses, they have been found economical for the longer hauls usually done with horses. With the short hauls the time of loading and unloading is so great a factor that horses afford the greatest economy. The following figures taken from the cost sheets of last year will demonstrate to those who are interested in haulage economy some very potent facts, as they show actual expense, but they do not represent the business developed that will no doubt be continued, nor do they indicate the high standard of work possible with the proper haudling of tarvia. The detail is of the five-ton Alco truck, which was worked consistently:

Average miles a day	41.14
Ton-miles a day	140.59
Gasoline, miles a gallon	2.46
Total cost a mile	\$0.316
Cont a ten-mile	0.170

The costs stated include gasoline, oil, grease, repairs, cleaning, tires, wages, depreciation, and fire and liability insurance.

MANY FAVOR STANDARD TRUCK WARRANTY.

Advices received by the executive committee of the National Association of Automobile Manufacturers show that 14 members out of 33 now engaged in the production of commercial vehicles have definitely adopted the new standard truck warranty and will incorporate it in their new catalogues and contracts of sale. In addition, 14 others, not members of the association, will follow their example.

These concerns are: Members, Baker Motor Vehicle Company, Federal Motor Truck Company, Gramm Motor Truck Company, Kelly Motor Truck Company, Knox Automobile Company, Locomobile Company of America, Packard Motor Car Company, Pope Manufacturing Company, Reo Motor Car Company, Selden Motor Vehicle Company, United States Motor Company, Waverley Company and White Company; non-members, Auglaize Motor Car Company, Brown Commercial Car Company, Chase Motor Truck Company, Champion Wagon Company, Dorris Motor Car Company, Geneva Wagon Company, Gramm-Berustein Company, Harwood-Bailey Manufacturing Company, Hatfield Auto Truck Company, Kearns Motor Car Company, Sanford Motor Truck Company, Stewart Motor Corporation, U. S. Motor Truck Company and Veerac Motor Truck Company.

There also are four members and nine non-members, who approve the warranty just as it is written and will adopt it if a majority of the truck makers do so. These are: Members, Nordyke & Marmon Company, Ohio Electric Car Company, Walter Motor Truck Company, Willys-Overland Company; months of the Motor Company of the Company of the Motor Company

members, C. L. Barker, Bowling Green Motor Car Company, Chicago Fneumatic Tool Company, Dayton Auto Truck Company, Marathon Motor Works, Moreland Motor Truck Company, Poss Motor Company, Sandusky Auto Parts & Motor Truck Company, H. E. Wilcox Motor Car Company.

Three other members who are not yet actively engaged in the commercial field state that as soon as they enter it on a sufficient scale to have need for a guarantee they will use it. These are: Buick Motor Company, Columbus Buggy Company and Jackson Automobile Company.

Only five members heard from are opposed to the use of the warranty. They are: Autocar Company, Ford Motor Company, H. H. Franklin Manufacturing Company, General Motors Truck Company and Pierce-Arrow Motor Car Company. Their objection is that they do not consider it sufficiently liberal, particularly as regards its duration. They prefer a guarantee for one year, or even, in one or two cases, one without limitation. The Buckeye Manufacturing Company, Driggs-Seabury Ordnance Corporation, National Motor Truck Company and Wichita Falls Motor Company, all non-members, are of similar opinion. In the case of the Buckeye and National companies, their litcrature is already out, incorporating a year's guarantee, and they do not feel that they can recall this now and substitute the 90-day standard warranty.

The committee feels very much gratified with the results already accomplished and looks for even more general adoption.

RECENT MOTOR VEHICLE PATENTS



703

Morton Adjustable Wristpin Bearing.

October, 1912.

An adjustable wristpin bearing has been patented by Ezra F. Morton, Lone Pine, Neb. It comprises a pair of blocks, each having a semi-circular opening, a pitman provided with bars having aligned openings, wedges extending through openings, and a locking wedge and means for locking and adjusting same.

Adams Lubricating Device.

Conrad R. Adams, Buffalo, N. Y., assignor to the Pierce-Arrow Motor Car Company of the same city, has been granted a patent for a lubricating device for bearings of the worm drive type of gears, adaptable for the overhead design. A helical blade having an inclination opposite to that of the threads of the worm is mounted between the latter and bearing, and forces the lubricant to the bearing through a longitudinal passage.

Seifried Resilient Hub.

A patent for a resilient vehicle hub has been grantol to Earl J. and Isaac G. Seifried, Findlay, O. It comprises a hub having a circular plate with a central opening, a shifting member on each side of said plate, each movable at right angles with the other and in a different plane therefrom, means for cushioning each member and an askle extending through and supported in both shiftable members.

Heller Sanding Device.

Earnest Heller, West Nottingham, O., has patented a sanding device for motor cars, comprising a hopper and a discharge pipe. The latter is so mounted that it may be adjusted to any position by means of a pedal actuated chain and automatically returned to a raised position. In service the discharge pipe is located in front of the wheels, the sand being fed as desired.

Valois-Groise Spark Plug Tester.

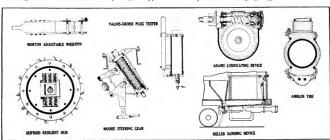
Joseph Valois, Alphonse and Armand Groise, Holyoke, Mass, have been granted a patent for a spark plug tester. It comprises an upper and lower metallic head between which is located a glass tube. The spark plug is screwed into a suitable opening and another aperture is provided for introducing air for compression, the pump being attached and a part of the device.

Moore Steering Gear.

A steering gear has been patented by Van Zandt M. Moore, Cleveland, O., which comprises the combination of a worm shaft and two worm wheels, the latter having opposed engagement with the different worm threads, and turning in the same direction for a given rotation of the worm shaft, means for constraining the worm wheels and an operatable connection from the worm wheels.

Ambler Vehicle Tire.

Howard M. Ambler, Philadelphia, has been granted a patent for a vehicle tire which is a combination of a pneumatic and solid tire. The former is provided with flanges for attaching the solid member, the latter being secured by means of clamping rings.



Some Recent Patents of Interest to the Owner, Driver, Garageman and Manafacturer, Including Spark Plug Tester, Sanding Device, Combination Tire, Steering Gear, Etc.



AINTS·FOR·PROPER MAINTENANCE

A Department for the Owner, Driver and Repairman.



BUILDING A PIT IN GARAGE.

In order to perform successful repair work the garage should be equipped with a pit and the ambitious driver who cares for his own machine will find he will save much valuable time, as well as exertion, by installing one. It makes easy the work of adjusting minor parts and will be appreciated when taking up councering rods and main bearings, as the work may be performed comfortably and without being obliged to lie upon the floor. In disassembling the steering gear and when the post must be removed it is difficult to handle this member on some cars without a pit.

At Fig. 1 is presented a working plan, the dimen-

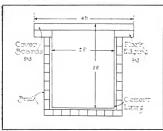


Fig. 1—dutining Working Plan and Dimensions of Brick and Cement Pit for the Garage.

sions and material being outlined, and while at first glance it may appear expensive, it can be constructed at a reasonable figure. This design, however, has the advantage of being very durable and easily cleaned.

The depth of the pit outlined is three feet six inches, which is the average of standard pits, although it may be altered to suit the height of the workman. A width of two feet six inches will be sufficient to permit of moving about without undue cramping, while the length may be about four feet.

In the design illustrated the retaining wall is constructed of brick, ordinary members being laid flat and erected to within six inches of the floor level. The bottom of the pit is also of brick. After the mortar has set the pit is lined with any durable cement. Planks, nine by three inches, are utilized to form the support for the cover boards which are also of the same dimensions. These boards are secured together and a ring fitted to enable the cover to be removed and replaced. The cover should be flush with the garage floor.

Another method is to make a box of heavy planking of the above dimensions and paint the outside with a crossote preparation to preserve the wood against the attack of moisture. A design of this type is constructed readily and without expense and the interior may be comented. A small set of steps may be constructed easily and will save much effort in getting into and out of the pit. They may be left in it at all times.

SPEED OF CUTTING TOOLS.

To obtain the best results from steel utilized for cutting purposes, attention must be given to the use of calculations in determining the proper speed of the work or tool, according to conditions. The average machinist in ordinary practise does not make use of these rules, but depends upon knowledge acquired through experience and observation. For the benefit of those not familiar with rules for finding cutting speeds, and to obviate the necessity for guessing at the proper speed, the approximate cutting speed at which tools should be run in the machining of different metals is given herewith:

Circumferential	Feet	8	Minute.
-----------------	------	---	---------

 Cast Iron
 14 to 16

 Mallemble Iron
 16 to 20

 Sleel
 12 to 15

 Brass
 28 to 40

The circumstances and conditions upon which depend slight variations of the speeds given are numerous, among which are: Whether a rough or finishing, coarse or fine cut, is being taken; the form and shape of the cutting tools; the toughness and density of the metals being worked upon, and the surface machined without grinding. There is considerable work done in the lathe or planer which requires cutting that projects far out of its holder. For such work the cutting rates must be considerably less than above given. Very often the texture of the metal is tough and hard, necessitating slower working and finer feeds in machining in order to perform successful work.

REMOVING DENTS FROM BRASS.

Frequently the repairman is called upon to remove dents from the lamps or horn. While the marks may be obliterated to a certain extent by placing a block of wood inside the article and tapping the outside with a wooden mallet, fine wrinkles often remain. These may be eradicated easily by utilizing a burnisher. Place a solid substance on the underside of the object and with a little pressure of the tool on the opposite side, the indentations can be smoothed out. The burnisher should be made of tool steel and highly polished after being hardened. Tools of any desired shape can be made for the work in hand.

CRACKED INTAKE MANIFOLDS.

In fitting new gaskets between the intake manifold and the cylinder care should be exercised in tightening up the nuts on the studs, especially if the design of the intake pipe be such that it will not withstand strains. When the latter is of aluminum, and of light construction, it is cracked easily and sometimes the break will not be perceptible to the eye. As a tiny opening will admit air the mixture consequently is weakened and the motor will run irregularly at low speeds, but operate correctly at a higher rate. When the crack is a small one, a temporary repair may be made with thick shellar, applying several coats and allowing each to dry thoroughly. The repair will endure for some time and the writer operated a car for an entire season under similar conditions.

RULES FOR CALCULATING SPEED.

The following rules may be employed for calculating rotations, also the size of pulleys for given speeds: To find the number of revolutions, given the diameter of the driven, multiply the size of the driver by its number of turns and divide the product by the diameter of the driven. The quotient will be the desired number of revolutions a minute.

When the diameter and revolutions of the driver are known, to find the size of the driven that shall make any number rpm, multiply the given diameter by its number of revolutions and divide the product by the number of required turns of the driven. The quotient will be ins diameter.

To ascertain the size of pulleys for given speeds, multiply all the diameters of the drivers together and also the sizes of the driven; divide the former by the latter and multiply the quotient by the known number of rotations of the main shaft.

WELDING A SCORED CYLINDER.

The acetylene welding process is largely employed in repair work and many apparently worthless parts are renovated, saving the expense of new members. An instance of the walls of the cylinder being badly sorted by a loose wristin was noted recently in an overhaul, and the engine being of the block type, it was decided to try to effect a repair by the welding process, as the cuts were too deep to permit of their removal by grinding.

The welding was completed satisfactorily and as it was necessary to make a pattern for a new piston to fit the enlarged bore after grinding, it was decided to have all the cylinders ground to the same size and fit new pistons throughout. The grinding enlarged the bore only 01 inch, so that it would have been entirely feasible to make a new piston to fit that member only, without affecting the torque to any great extent, although it is recognized that pistons should be uniform in weight.

HAMILTON BI-FUEL CARBURETOR.

The increased cost of gasoline in England is stimulating the efforts of the engineers and already several carburetors designed for kerosene have been announced and are being tested. The latest addition to the ranks of the heavy fuel vaporizers is the Hamilton bi-fuel carburetor, an announcement of which was

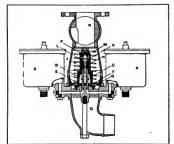


Fig. 2—The Hi-Fuel Carburctor, Utilizing Combined Mixtures of Gasoline and Kerosene and Having Two Separate Adjustable Jets.

made in the recent issue of the Autocar, an English motoring print.

As the name implies, the device combines gasoline and kerosene, which does not appear to be an easy matter, but it is stated that the Hamilton carburetor mixes the two fuels successfully and that in practise a motor has been operated on a supply of 00 and 40 per cent. gasoline and kerosene, respectively. This has heen accomplished by the utilization of the usual hot air intake pipe, while with the whole or greater part of the induction pipe heated it is stated that the above figures were reversed.

By referring to the carburetor which is depicted at Fig. 2 it will be noted that two float chambers are provided. A and B, for gasoline and kerosene, respectively. Two separate icts are also employed, these being outlined at C and D. At the base of the mixing chamber I is the air inlet which forms a ring around the two

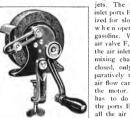


Fig. 3-The Lather Grinding Device.

iets. The fixed air inlet ports E are utilized for slow speed when operating on gasoline. When the air valve F, between the air inlet and the mixing chamber, is closed, only a comparatively restricted air flow can pass to the motor. This it has to do through the ports E. so that all the air used has to pass up the choke tube H.

The seating G, on which the air valve F is pressed by a helical spring M, is formed in the lower part of the chamber I. It will be noted that the seating G of the valve F is curved and shaped in such manner as to graduate the flow of air between it and the air valve. as the latter rises under the increasing section of rising engine speed, in such proportion to the travel of the valve that the negative pressure in the mixing chamber I remains practically constant,

The air valve consists of something more than a mere flat annulus, for it is carried upwards to form a bridge piece P above the choke tube of the iets, and in this bridge piece the needle valves K and L are held in such position as to regulate the flow of fuel through the two jets. As they screw into the bridge piece and are held by small lock nuts, their position is adjustable, so that the flow of fuel in either jet can be relatively adjusted to requirements.

The operation of the carburetor is best explained by the method of adjustment. In the first place the cross sectional areas of the two fuel jets are so proportioned as to give in general terms the required relative flow of two sorts of fuel. The needle valves are fitted to the bridge, and, with the main air valve shut, the needle controlling the kerosene jet is screwed down until it entirely shuts off all flow of this fuel, while the needle regulating the gasoline orifice is adjusted to allow the passage of inst sufficient fluid to carburet the air capable of passing up the choke tube H. Under these conditions it is practically as though the engine were running on a pilot jet, for the supply is sufficient for slow running with no load or starting from cold, Directly the throttle is opened, however, and the engine speed increases, the additional suction raises the air valve F, which thus automatically has the effect of increasing the gasoline aperture and opening up the kerosene jet in its rise. In this way the motor, started on gasoline, is able to continue to run on the fuel mixed in proportions decided by the respective areas of the two nozzles.

THE LUTHER TOOL GRINDER.

A small tool grinder is of service in the garage not equipped with power as by it chisels, etc., may be sharpened and much labor saved. The Luther Grinder Manufacturing Company, Milwaukee, Wis., is marketing a small, compact grinder for the shop not fitted with power and as will be noted by the illustration at Fig. 3 the machine is manually operated. The mechanism actuating it is contained within a hollow wheel and consists of a series of four driving gears and pinions which produce a speed of 20 revolutions to every turn of the handle. All bearings are one-piece and the working parts are fully enclosed and protected from the dust, etc.

The grinding wheel is a composition known as Dimo-Grit, the new diamond sharpening substance, and it is 5.5 inches in diameter. The design is such that it may be disassembled easily and packed in a box 5.75 inches long. An adjustable tool rest is a part of the equipment, also a clamp for attachment to the bench, etc. The tool is constructed of high grade material and is moderately priced.

MAGNA REFLECTOR CLIP.

In working over the lathe, bench, etc., it is important that the light be good. An open electric lamp is not satisfactory as the rays are more or less blinding. The Sachs Laboratories, Inc., Hartford, Conn., is manufacturing a clip for use in connection with its improved reflector and the device depicted at Fig. 4 B is inexpensive and practical. It comprises a one-piece punching of insulated material provided at one end with two curved clip arms which engage the neck of the socket and at the other end with the small curved hook which connects with the flexible cord when the lamp is held horizontally and the light is directed downwards. The socket may be adjusted in the clip

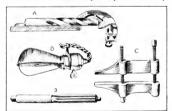


Fig. 4-Useful Tools for the Garage and Repair Shop: A, Rev ington Twist Drill Grinding Gauge; R. Magna Clip, as Adjustable Device for Drop Lights; C, Le Count Vise Clamp; D. Peerless Expansion Renmer.

and the light directed to any desired angle when the lamp is held in the above position. It is made to fit any standard socket and cord.

REMINGTON DRILL GAUGE.

Crooked or irregular holes in drilling are invariably caused by the drill not having been ground accurately. The grinding of twist drills is quite an art and they should be accurate if good results are to be obtained. The cutting edges should have a proper and uniform angle of 59 degrees with the longitudinal axis of the drill, and should be of exactly equal length. The lips should be well and sufficiently backed off or cleared, qualities essential for good work and which will make for less grinding.

The Renington Tool & Machine Company, Boston, is manufacturing a simple and practical twist drill grinding gauge which is shown at Fig. 4 A. The drill to be tested is placed in the V groove of the device and the gauge jaw is raised or depressed until the point of the drill is central with that of the V gauge. The cutting edges of the drill should be horizontal with the flat surfaces of the gauge jaw. The latter are milled with an angle of 59 degrees and the cutting edges of both lips of the drill should be parallel with those of the gauge. When one lip is lower than the other the strain comes upon the shorter member, producing irregular and larger holes than the diameter of the drill, and increasing the liability of breakage.

LE COUNT VISE CLAMPS.

The vise clamp serves several useful purposes in the repair shop and the William G. Le Count Clamp Company, South Norwalk, Conn., is marketing these devices, one of which is shown at Fig. 4 C. The clamps are constructed of steel castings, nicely finished and made in six sizes, having openings from 1.25 to 6.25 inches

PEERLESS EXPANSION REAMERS.

When openings must be enlarged slightly expansion reamers are of service. The Cleveland Twist Drill & Reamer Company, Cleveland, O., is manufacturing a line of these, one of which is illustrated at Fig. 4 D. The diameters of these tools range from .5 inch to 2.5 by thirty-seconds. The company makes sixty-fourth sizes to order. The reamers are constructed of high grade material, carefully finished to correct size and are moderate in price.

CORRESPONDENCE.

Reducing Star of Tubing.

(13)—Am fitting a priming attachment to my car and find that the connection of the device is too small to permit of its taking standard copier tabling. The connector cannot be employ solder as I wish to disconnect the part at times. Have tried to force tabling in connection but made a peor job. In Watertown, N. Y., Sept. 2 its size: "OWNILL-BILYEIL.

If the tubing is slightly large it may be reduced by utilizing a tap wrench and the operation is outlined in the accompanying illustration. The wrench is placed over the end of the tubing and tightened slowly and easily as the tool is rotated. This will reduce the size as desired and the walls of the pipe will not crimp if the adjustment is made gradually.

Trucks I sing Sleeve Valve Motor.

(14)—Are there any trucks marketed in this country that are fitted with the Knight or sleeve valve motor and if so please give name? What trucks use the motor abroad?

A. R. G. Omaha, Neb. Sept. I.

At present the sleeve valve type of motor is not being utilized by manufacturers of commercial cars in this country so far as announcement has been made. Abroad the Daimler Company, Ltd., Coventry, England, employs the Knight motor, also the Deasy Motor Car Manufacturing Company, Ltd., of the same city. The latter fits it to its ambulance only while the Daimler utilizes it with several models. Argylls, Ltd., Alexandria, Scotland, also employs a sleeve motor of its own design in commercial cars.

Converting Pleasure Vehicle.
(15)-1 have an opportunity to purchase a four-cylinder

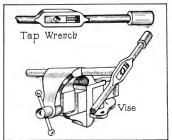


Fig. 5-Depicting Method of Using Tap Wreach to Reduce Diameter of Brass or Copper Tubing.

car and am thinking of having a special body built for it and using it for general hauling of merchandles. The loads I haul frequently are one ton or more. Having heard various opinions upon the merits of the converted pleasure car would be pleased to have you advise me if it will give practical to the first opinion of the product of the product of the Brockton, Mass. Sept. 2.

Although many pleasure automobiles have been built over for commercial work, where heavy loads are to be carried the writer is of the opinion, as are several authorities, that the best investment is a motor car designed especially for transportation. The cost of overhauling the pleasure vehicle and building the body might be considerable and the efficiency of the machine after this work is problematical. As the car is an old model difficulty might be experienced in obtaining spare parts and delays are costly.

A mirror of the round, vest pocket type is handy in reflecting rays of light upon dark places of the car when seeking lost nuts, etc.

FEDERAL IN MANY LANDS

Product of Well Known Detroit Concern in Service in All Parts of the World.

As an indication of the all-around ability of the Federal truck, made by the Federal Motor Truck Company, Detroit, it may be cited that within the past few weeks orders have been filled from sections of the globe widely differing in their climatic and geographical conditions. The Federal company claims to be the first to invade Maske.

The Consolidated Development Company of Nome, said to be the largest ore mining corporation in Maska, sent two representatives to the States in quest of a one-ton truck that would overcome the difficulties encountered in these regions. After making a thorough investigation of what the market had to offer, they placed an order with the Standard Motor Car Company, Federal agent in San Francisco, calling for three one-ton vehicles which will be utilized in hauling ore from the mines among the mountains to the export stations along the coast.

About the same time a representative of Futubaya & Co., Tokio, Japan, conducted a similar investigation of the American one-ton vehicles, with the result that an order was placed for a Federal of this capacity. The concern is a large exporter and importer, and decided in favor of the Detroit product because of its simplicity and "ever-readiness."

The American Motor Truck & Auto Company, Melbourne, Australia, sent three men to this country to look over the one-ton vehicles with a view to establishing an agency in Melbourne. All three decided in favor of the Federal and the contract was signed.

CONCERNING TRUCK EFFICIENCY.

G. M. C. Officials Suggest Factors Which Should Enter into Consideration of Problem.

According to Glesson Murphy and F. L. Ditzler, officials of the Generals Motors Truck Company, Pontiac, Mich., who have been visiting the principal eastern G. M. C. branches, the attitude of big business institutions toward the commercial moor vehicle is changing very rapidly. The question no longer seems to be as to whether or not concerns can safely adopt mechanical transportation, but rather as to how they can best equip their business with motor trucks. They say:

"As a result of our experience with commercial vehicles and our study of the entire matter, it seems to us that any prospective purchaser of such equipment will find his problem greatly simplified if he will first answer for binself a few fundamental questions.

"First.—What is the nature of the routes to be covered in the service? Is it all a town service or all a country service, or does it partake of both characters? "Second—What is the general character of the street and roads? Are they comparatively level or are steen hills numerous?

"Third—What are the distances which each vehicle must cover in a day's round?

"Fourth—What is the character of the load to be carried? Is it light but bulky, or heavy in comparison with the bulk?

"Fifth—Are the packages to be carried of large size, such as heavy furniture, pianos, safes, or the like, or are they small, such as groceries, jeweller's boxes, light dry goods, etc.?

"Sixth—Are the goods and packages of such a nature that they must be protected from dust and rain, or an they be carried in open wagons or those with so-called express bodies?

"Seventh—Are they of a fragile nature, calling for unusually flexible spring suspension if the load is to be moved at speed?

"Eighth—What quantity of goods will usually be loaded up for each trip? Will the load be carried the full distance, or only half the distance? Do the vehicles ordinarily return empty, or are they partly loaded?

"Ninth—What is the most convenient body construction to admit of easy loading and unloading of the class of goods to be handled?

"Tenth—Would it be desirable in the case of heavy goods to enable the power of the motor to be utilized in loading and unloading?

"Undoubtedly there are many others, but those mentioned are sufficient to indicate how numerous are the points to be kept in mind. It is quite plain that three points—load to be carried, distance to be travelled and country to be covered—must all be considered carefully."

A Brush light delivery wagon, made by the Brush Runabout Company, Detroit, has proved an efficient method of delivery for J. A. Rohuer of Akron, O., for the past three years. He claims that there was not an extra dollar of expense for running during the first two years, but during the third year he had to expend \$40 for repairs. The wagon does the work of two horse drawn vehicles. Puenuatic tires were fitted to the vehicle in the first place, but now it is equipped with Motz cushion tires, which the owner believes better suited to this style of service, than the pneumatic.

The Moon Motor Car Company of St. Loais, Mo. recently received an order from the city of Boston, Mass., for a Moon motor patrol. The contract was secured in competition with 32 other manufacturers of automobile patrol wagons. The same company also recently received a contract, in competition with 29 other manufacturers, to supply St. Louis with three machines, an ambulance and two torring cars. St. Louis' first order for a Moon car was placed in 1910, when a motor patrol was purchased. The maker has reason to feel pleased because of the repeat order.

ECONOMY IN POLICE DEPARTMENT SERVICE.

Experience of Worcester, Mass., with Two Patrols and an Ambulance, All of the White Make, Indicates Decided Efficiency at Substantial Saving in Expense.

By C. A. French.

MUNICIPAL authorities are interested in economical administration. This is true despite the well defined opinion that the finances are not guarded with that care which would be nomifested in the private business. Office holders and tax payers watch the tax rate carefully. Sometimes economy is effected at the expense of efficiency, and often the public is as much to blame as the administration.

With special reference to motor equipment, it may be assumed that automobiles are unich more eificient than horses. This applies particularly to the fire and police departments, although it has been demonstrated that the same results can be obtained in other branches of the city's activity. It is not always possible to show a marked economy, however.

In the fire department, for instance, there are two

w e 11 defined factors making for economy, One of these is apparent, and the other must be calculated with care, though it is none the less real. If it is possible to show that a given piece of motor driven fire apparatus has cost a certain figure and that this figure is less than for for a

corresponding lorse drawn outlit, the economy is so apparent that the tax payer is satisfied at the outset. But it is more difficult to convince the general public that dollars are saved to the individual tax payers by the increased efficiency of the department—that because fires are extinguished before they have had time to become serious, the total taxable wealth has been affected in a material degree.

And if this be difficult with the fire department, it is even more so with the police. Police efficiency is demanded above all things, but economical efficiency, if there be any such thing, is wanted. And here again that unapparent economy makes itself felt, since the most efficient protection possible reduces the danger

of individual loss and has its effect upon the total taxable wealth.

Where the ambulance work is delegated to the policy department, as it is in a large number of cities, there is even greater need for efficiency, since in matters of life and death economy has little place. There is little room for argument relative to the use of motor ambulances, particularly as the emergency calls are nost frequent during those seasons when the horse is least able to respond. And this holds especially true in the lift towns and cities of New England.

For the past year the police department of Worcester, Mass.—a city, which like Rome is built on seenhills—has had three White vehicles, two patrols and an ambulance, made by the White Company, Cleveland, O., and sold through Harvey Cashman of the

White Motor Car Company in that city. Chief David A. Mathews expresses himself as highly pleased in every respect with their p e riormance. The city has kept very accurate record of the gasoline, oil. grease, etc., used by these three cars. and while the accounts for



White Ambaiance in Service with Worcester Police Department at Headquarters.

each have not been segregated, the figures present a very interesting situation with reference to economy.

One of these parrols and the ambulance are housed at headquarters on Waldo street, while the other patrol is at Station 2 on Lamartine street. The patrols are no permitted to leave the city, but the ambulance has been sent over the city line on a few occasions, in cases of emergency. Whenever it does work for other numicipalities Worcester makes a charge for such service. A table of calls and mileage, presented herewith, shows the amount of work the three cars have been called upon to do, the ambulance calls being listed separately, although the two patrol wagons are consolidated.



White Patrol No. 1, Stationed at the Hendquarters on Walde Street

The city buys its gasoline in barrel lots, under contract, and has been fortunate in securing a price of 10 cents a gallon. Its oil is bought in the same manner, the cost figuring out at 46 cents a gallon, for an oil of specially high grade. The grease also is purchased in bulk. Another table sets forth the amount paid for these three items during the past six mouths, and affords a means for determining the average monthly or yearly expense. It may be stated that the fixed year of the city does not expire until Dec. 1, and detailed figures on all items will not be available until after that time.

The police department has no horses at present. The space formerly utilized as a stable is now used as a repair shop, under the direction of Edward E. Wilson, as head mechanic, and here all necessary repairs are undertaken by him, assisted by the chauffeurs on duty. Each vehicle has been unfortunate

enough to be in at least one serious accident. One of these cost the department \$100, although an automobile man estimated the cost would be in the vicinity of \$400 before the work was begun. The municipal repair shop does not contain every tool of value in undertaking such repair jobs, but the amount of outside work necessary has been surprisingly small, under the circumstances. The other two accidents mentioned cost the city \$15 and \$20, respectively. Of course, this does not include the salary of the head mechanic, but since no more men are employed with the motor cars than with the horses, this

is not deemed necessary.

The tire problem naturally has been found the most difficult of solution. Tire work is undertaken in the police repair shop, and no less than four prominent makes of shoes have been tried out in this work. Mr. Wilson deelares that the best that could be obtained with three of them was from 1600 to 1700 miles. Those used at present, and for the past six months, are of the Swinehart make, and from these an average of 2500 miles has been obtained, although one pair resulted in 3000 miles of service. The present figures of the department show that the tire expense has been about five

cents a mile. Since pneumatics are employed, and no attempt is made to use extreme care in rounding corners, etc., on hurry calls of this nature, the result obtained from these Swine-hart tires is decidedly satisfactory to the department. It is possible that the complete figures for the year, which have not been tabulated, will present a somewhat better result.

In another table is shown the comparative costs of the horse equipment for four months, these figures being taken for the first four months of service with the automobiles, and the corresponding months of the previous year when horses abone were employed. It should be stated that the ambulance and one patrol were placed in service in October, 1911, and the other patrol about a month later.

Under the old regime, eight or nine horses were fed and maintained all of the time, and it often be-



White Pairel No. 2. Connected with Station 2 on Lamortine Street

CALLS AND MILEAGE FOR ONE YEAR.

Amh	ulance	Pac	rols
Calls	Miles	Calls	Mille
258	729.0	441	446.
239	N55,0	429	457.
222	739.0	428	473.
256	653.0	45.2	575.
267	940.0	363	401.
284	978.0	37×	553.
309	1067.5	434	770.
287	939.0	472	759.
274	999.0	544	N75.
28N	973.5	467	793.
334	1118.0	571	1064.
306	1942.0	5NO	962.
	Calls 258 239 222 256 267 284 309 287 277 274 258	258 729 0 239 855,0 252 739,0 256 652,0 267 940,0 284 978,0 309 1067,5 287 939,0 274 999,0 278 913,5 334 1118,0	Calls MHes Calls 258 729.0 441 239 855.0 429 256 652.0 422 256 652.0 452 267 940.0 352 244 978.0 372 209 1667.5 424 274 939.0 472 274 939.0 514 288 973.5 467 234 118.0 571 118.0 571 118.0

came necessary to hire a horse or two to replace those on the sisk list. The three accidents previously mentioned occurred during the four months listed in the comparative table, and the tire expense was somewhat larger during that period. The comparison offered in this table hardly does justice to the motor vehicles, therefore, and is presented only as indicating the exact experience of the department with its new vehicles.

A comparative estimate has been made for our year, this being based upon the results, so far as it is possible to learn them at this time, as submitted in the other tables, with the exception that the accident item is distributed over the entire year. No attempt has been made to consider the first cost of either equipment. The table is one of maintenance costs only.

Referring once more to the table of calls and mileage: It will be noted that the total of calls for the ambulance during the year ending Sept. I, 1912, was 3324, while the annual report of Chief Mathews for the fiscal year ending Dec. I, 1911, shows 2948 calls for that year. This would indicate an increase of approximately 12.5 per cent. The same sources of information give a total of 5759 calls for the two patrols in 1912 as against 5017 in 1911, a gain of practically 16.6 per cent.

The increase in mileage covered also is of decided intreest. The ambulance covered 8794.7 miles in 1911, and 11,043 in 1912, an increase of a little more than 25 per cent. The patrols were run 5314 miles in 1911, and 8130 in 1912, a gain of nearly 53 per cent. Of course these figures overlap to a certain extent, but they are sufficiently accurate to indicate the manner in which the amount of work has increased during the year.

It would appear from these tables that the city of Worcester has secured from 25 to 50 per cent, more efficiency at an economy of at least \$135.17 in mainte-

COMPARATIVE FIGURES FOR FOUR MONTHS.

Horse Draw	n Vehic	len.	
Hay	& Grain	Wagon Repairs	
Chetoher.	\$99.74		
November.		\$3.25	
December	400,14	15,50	
January	130.86	21.80	
Totals	\$630.70	\$40,50	\$671.25
	Kquipn	ent.	
8	upplies	Repairs	
October	175.66	\$21.80	
November.	94.62	16.10	
December.	120.46	167,39	
January	110.57	26.15	
Tutula 1	501 21	\$221.44	\$832.75

ALTOMOBILE SUPPLY ACCOUNT.

1912	Gasoline	0.011	Grease
March.	\$35.50	\$0.55	
April.	46.50		\$1.30
May	24,80	16.35	
June	43.00	0.55	1.30
July	47.00	17.85	
August	47.00	0.55	4.00
Totals	8243 KB	\$35.NS	\$6.60

nance costs through the installation of White motor vehicles. Basing the estimate upon the figures contained herein the maintenance cost for sufficient horses to cope with this additional work would have been \$28950.65, showing a balance in favor of the automobiles of over \$1000. With a continued corresponding increase in efficiency, it would take but a short time to wipe out the first cost of motor vehicles.

The experience of the Worcester police department will prove of decided interest to those who are studying economy in municipal service. Chief Mathews declares the White cars have given splendid satisfaction. There never has been a time when they were not ready to respond. The patrols answer all fire alarms as well as regular police duty calls, and often they have been pressed into service as ambulances, when the ambulance and surgeon were absent on a two-mile hurry call. The cutrie department is satisfied that when the fixed year is ended the showing will be even better than the present figures indicate.

Talbot with the Victor—Frank R. Talbot, who for several years has been connected with prominent rubber companies in Akron, O., has become affiliated with the Victor Rubber Company. Springfield, O. F. B. Patrick, a well known newspaperman, formerly of the advertising staff of the Chicago Evening American, also has joined the Victor force and will be employed in the advertising and sales departments. The Victor company is increasing its capacity in order to take care of the rapidly growing business in its truck tire department.

Hathaway Succeeds Whitney—At the annual meeting of the Commercial Motor Vehicle Association at Boston recently, J. S. Hathaway of the White Company was elected president to succeed J. F. Whitney of the Whitney-Barney Company. Plans for the next commercial vehicle show at Boston, to be field March 19-26, were discussed.

COMPARATIVE ANNIAL EXPENSE.

Wagon repairs						121.50	
Total							\$2013.6
	Thre	e Mot	or 1	eblei	en.		
Gasoline						\$487.80	
Oll						71.70	
Grease						13.30	
Tires						610.51	
Repairs .						444.32	
Insurance						251.10	
Total						-	1878 4

NEWS OF THE COMMERIAL VEHICLE INDUSTRY.

United States Motor Company in the Hands of Receivers and Plans Offered for Its Reorganization--Kissel Company Secures New Plant--LaFrance Seeking Capital.

The situation with reference to the financial condition of the United States Motor Company, New York City, capitalized for \$42,500,000, was brought to a deeided head Sept. 12, when the Brown & Sharpe Manufacturing Company, Providence, R. L. filed a bill of eomplaint in the United States court of equity, alleging that the eoncern was insolvent and asking for the appointment of a receiver. Later that same day Judge Charles M. Hough of the United States district court for the southern district of New York, appointed W. E. Strong, a representative of the banking interests and recently chosen a director of the United States Motor Company, and Robert Walker, an attorney, as receivers. These men have instructions to continue the business of the concern and report to the court by Oct. 28. Still later the same men were appointed ancillary receivers to look after the business of the various subsidiary companies in their several cities.

The present difficulty had its origin some time in June, when it became known that the company would be unable to meet some \$750,000 in paper then due, and an extension of 90 days was granted by a creditors' committee. At that time an advisory committee was appointed, some of the members being representatives of the financial interests involved, its object being to continue the business and to give equal protection to all creditors. This grace period expired Sept. 13.

Several plans for reorganizing the company, or at least of refinancing it were considered by the advisory committee, and a number of interviews were granted in which it was stated that the condition of the company was such that if it could secure necessary money all difficulties would be met. It is stated that the action of the Providence concern was taken with the approval and at the request of a majority in amount of the entire indebtedness, representing claims of some \$7,000.00. The Brown & Sharpe company is a creditor for \$70,000 in merchandise.

According to the petition the liabilities of the conpany are estimated at \$12.250,000, consisting of
\$6,000,000 of debenture bonds and claims against the
company by banking interests and for merchandise totailing \$6,250,000. The assets are claimed to be valued at \$15,000,000, these consisting of cash, bills receivable, etc., and are held to be embarrassed by the
factory plants of the subsidiary companies, which are
selechaled at \$6,250,000, against which there is a mortgage of \$200,000. Quick assets of July 31 are said to
be \$9,250,000, of which \$4,000,000 represents factory
inventories and the remainder cash in hand and bills
receivable.

The suit involves all of the subsidiary companies, including the Maxwell-Briscoe Motor Company, Tar-

rytown, N. Y.; Columbia Motor Car Company, Hartford, Conn.; Dayton Motor Car Company, Dayton, O.; Brush Runabout Company, Detroit, and Alden Sampson Manufacturing Company, Detroit. It is understood that the capital stock of the E. R. Thomas Motor Car Company, Buffalo, N. Y., also was acquired by the United States Motor Company, some time within a year, and as this concern already is in the bankruptcy court it appears to be difficult to determine just how the suit affects this. There also are a number of companies engaged in manufacturing parts, etc., which are subsidiary concerns of the United States Motor Company.

It is stated that all of the subsidiaries, with the possible exception of the Brush Runabout Company, and of course, the E. R. Thomas Motor Car Company, are continuing production in about the same manner as they were 90 days ago. The receivers are said to have obtained permission from the court to advance sufficient money to meet the payrolls at the various plants from the general funds of the company and to make provision for administration.

Briefly stated, it would appear that the total indebtedness of the United States Motor Company is divided into two classes, the first of which is represented by commercial paper bearing two indorsements, one by the parent organization and the other by at least one of the subsidiary companies. The other class has paper with only one indorsement, and it is stated that practically all of the claims for merchandies are of this class.

Under the receivership action there are held to be two courses of action open to the company. The first is reorganization under some plan that will take care of the creditors and permit the company to secure sufficient working capital to manufacture and sell its product. It is stated that about \$5,000,000 is needed for these purposes. The other course is a sale in open court.

The committee is still at work formulating a plan for reorganization, and any attempt to state the amount of assessment or the method proposed is held to be premature by the committee. However, some mention has been made of a possible assessment of \$20 or \$25 a share, which former figure is said to be sufficient to raise about \$4.00000. At \$25 a share, some \$5.750,000 would result, and this is held to be sufficient for all present needs. There is a suggestion as to a compromise on \$22.50 a share, but no definite statement has been made.

According to the petition filed in court it would appear that the subsidiary companies are indebted to the parent organization and are liable as makers or indorsers of notes as follows:

tiden Sampson Manufacturing Compacturing Com	
	50,014.12
Total.	\$1,119,292.85
Brush Bunshon! Company.	
United States Motor Company	. \$1,027,663.3% 6,650,29
Total	. \$1,034,313.67
Columbia Wester I'mr Company.	
United States Motor Company Notes and accounts	
Total	
Dayton Motor Car Company.	
United States Motor Company	
Total	\$2,461,937,39
Mannell-Briscoe Motor Company.	
United States Motor Company	869,929.83 1,949,949.25
Total	. \$1,979,879,08

The total money on hand and receivables of the subsidiaries on Sept. 7, 1912, according to the same source of information, were as follows: portunity to produce 10,000 Kisselkars, pleasure and commercial, a year. The general offices of the concern will be removed to Milwankee, and it is anticipated that the plant will be in operation early in November. At present it will be used eachsively for assembling purposes, the production of parts being continued at Hartford.

The rapid expansion of this company within the past few years has brought it into ministal prominence, listide of six years it has grown from a \$50,000 corporation to a concern capitalized for \$1,000,000 and with a surplus of \$500,000.

LAFRANCE WILL REORGANIZE.

Increased Demand for Automobile Fire Equipment Makes More Capital Necessary.

According to information from Elmira, N. Y., the American-LaFrance Fire Engine Company of that



Plant of the Romadka Trunk Company, Milwankee, Wis., Recently Parchased by Kissel Malor Car Company,

Alden Sampson Mfg. Co.	\$49,315,79
Brush Bunabaut Co	79,787.21
Columbia Motor Car Cu	31,036.02
Dayton Motor Car Co	247,232.69
Maxwell-Briscoe Motor Co	242,761.27

KISSEL COMPANY EXPANDS.

Purchases Additional Plant in Milwaukee, Greatly Increasing Its Annual Output.

One of the most important amountements of the month is that of the Kissel Motor Car Company, Hartford, Wis,, which has purchased the plant of the Romadka Trunk Company in Milwaukee. This news follows, closely that of the completion of factory additions in Hartford, giving an increase of 40,000 square feet of floor space. The Milwaukee plant is modern, completely equipped and contains some 200,000 square feet of working floor space.

The Kissel company states that the new factory is ideally designed for its needs and that it will afford opcity is contemplating a complete reorganization, as a result of which it will be provided with some \$0.00,000 in additional cash capital. A greatly increased demand for automobile fire engines of the type manufactured by this concern is said to have made the present move necessary.

It is understood that the plan proposed by the fiscal agents of the company provides that the present bondholders will receive 100 per cent, in 7 per cent, preferred stock of the new company with a bonus of 3.3, per cent, in new common stock. The preferred stockholders are to receive 50 per cent, in the new preferred stock and 3.3.3 of common, while the present holders of common stock will receive 30 per cent, in new common. With the \$800,000 new preferred stock to be sold at par there will be a bonus of 100 per cent, of new common, this being offered to present stockholders on a lassis of four shares of preferred to every 10 shares of the old preferred and two shares of the new preferred to each 10 shares of the common.

NEW GENERAL MOTORS HEAD.

W. L. Day Becomes Vice President and General Manager in Charge of G. M. C. Production.

William L. Day, formerly general sales manager



William L. Hay, General Manager. General Mators Truck Company.

Lewis Motor Car Company, Racine, Wis., has resigned his position with the latter concern to accept the position of vice president and general manager of the General Motors Truck Company, Pontiac, Mich., to which he was recently elected. The announcement was m a d e by President Thomas Neal of the General Motors Company, the news coming as an interesting development

General Maters Track Formany.

esting development to those concerned in the vehicle end of the industry.

Mr. Day, previous to his advent in the automobile business, was for 27 years a prominent figure in the implement industry, being associated with the Parlin & Orendorff Plow Company, Kaisas City, Mo. He is

& Orendorff Plow Company, Kansas City, Mo. He is an able and efficient executive and his years of experience in marketing and production will prove valuable in his new duties.

in his new duties.

Glesson Marphy, who was temporary vice president and general manager of the General Motors Truck Company, will return to his regular work of assistant to the president of the concern, in which position he has become widely known throughout the industry as an expert on motor truck problems.

BROCKWAY LINE COMING.

New Concern Organized in Cortland, N. Y., to Produce Three Interesting Models.

The Brockway Motor Truck Company, Cortland, N. Y., has been incorporated with a capital of \$100,000 to manufacture a line of high grade medium priced commercial motor vehicles in three models with load carrying capacity of 1000-1800 pounds, 2000-2800 pounds and 3000-4000 pounds respectively. George A. Brockway is president of the concern, C. S. Pomeroy, vice president, and F. R. Thompson, treasurer and general manager.

Mr. Brockway, the president, is known throughout the United States as a manufacturer of high grade carriages and wagons, being also president of the W. N. Brockway Company, Homer, N. V., a concern known in this country for the past 60 years. Rodman S. Reed is chief engineer and superintendent of the company, being formerly connected for six years in a similar capacity with the Chase Motor Truck Company, Syracuse, N. Y.

CONTRACT FOR ADDITION.

Maker of Pope-Hartford Line Completes Arrangements for Increase of Production Capacity.

The Pope Manufacturing Company Hartford, Communication the Pope-Hartford pleasure and commercial vehicles, has let the contract for a substantial addition to its plant, nade necessary by the rapid influence of orders. It will be four stories high, besides a basement, adding 70,000 square (ect of floor space.

The walls will be mostly of steel sash windows, while the column spaces will be wide, with shallow floors. A semi-detached tower will contain all electors, stairways, etc., and a runway will connect with the basement garage. A passageway cut through the building will give entrance to the plant.

BECOMES DISTRICT MANAGER.

R. B. Curtiss Leaves Royal Equipment Company to Sell Chase Trucks in Middle West.

Royal B. Curtiss, formerly sales manager of the Royal Equipment Company, Bridgeport, Com, has resigned to become district manager of the Chase Motor Truck Company, Syracuse, N. Y., maker of the Chase truck, Mr. Curtiss will have his headquarters at Cleveland, O., and will have jurisdiction over terri-

tory embracing Ohio, West Virginia, Kentucky, Indiana, Illinois (except the vicinity of Chicago), Michigan and Western Pennsylvania.

Mr. Cirtiss regretted the necessity of severing his relations with the Royal Equipment ment Company, but the prospect of connecting himself with the delivery wagon feature of the antomobile industry appealed strongly to



Royal B. Curtiss, District Manager, Phase Motor Truck Company.

him. He is well Phase Motor Track Company, known to many who are interested in the manufacture of motor cars and accessories and carries with him to his new position the well wishes of many friends.

MORA 1500-POUND DELIVERY WAGON.

B ELIEVING that the largest field in the commercial car industry is in the 1800-pound capacity class, the Mora Power Wagon Company, Cleveland, O., has concentrated its efforts upon the production of a high grade machine of this type. It is not amiss to state that the men connected with the organization have had years of experience in building pleasure cars and while no details from the lighter machine have been copied those features making for simplicity, reliability and how cost of maintenance have been incorporated. Qualities emphasized of the Mora product are high grade material and the best of workmanship, simplicity and accessibility.

Two-Cylinder Power Plant.

The subject of power plant received decided con-

sideration by the designer of the Mora, and after a careful investigation of the various factors entering into the power vehicle delivery, the two-cylinder engine was adopted. Of this type the company points out that it provides continuous efficient service with minimum cost of maintenance and that it is well adapted to delivery work.

The Mora motor is a fourcycle, double opposed, horizontal, water-cooled unit having a 4,5-inch bore and stroke, developing 10-2 horsepower according to the S. A. E. formula, although it is stated that it has exceeded this rating in brake tests. It is located under the hood, is very accessible, and the starting crank is located in front, secured to the cross-tiebar of the frame extension.

The cylinders are cast of a special gray iron, carefully machined and ground to size, and may be removed easily, being bolted to the crankease, which is so designed that it is a simple unatter to disassemble the power plant. The pistons and rings are ground to size and carefully fitted, insuring good compression and a well balanced motor.

The valves are of liberal diameter and are adjustable. This is secured by a threaded member in the pushrods and it is an easy matter to loosen the lock and and compensate for wear. The pushrods are of liberal size and the portion carrying the adjusting device is offset. The pushrods are slotted and the construction of the bushings is such that the members cannot rotate.

Lubrication and Cooling.

Lubrication is by a combination splash and force feed system. A four-feed mechanical oiler is mounted upon the dash in plain view of the operator, and supplies oil to the working parts. It is actuated by an eccentric driven off the camshaft, which is extended through the crankease for this purpose.

Cooling is by the thermo-syplion principle, cooled huid being taken from the bottom of the radiator and led through pipes to the bottom of the cylinders, flowing thence through the water jackets to the outlet pipes on top of cylinders and to the top of the radiator. The pipes are ample in diameter and are threaded into the cylinders, connection between which and the cooler is by rubber tubing of substantial construction. The radiator is of the cellular type, mounted in front, and being of ample capacity, maintains proper temperature of the water under all conditions of service. Cooling



front, secured to the cross tie- The Mora 1500-Pound Delivery Wagon in Which is incorporated High Grade Material and Workmanship.

is assisted by fan shaped blades cast integral with the flywheel which is in front of the power plant.

The carburetor is a Stromberg mounted upon the right of the motor and just back of the right hand eyhinder, a position affording complete protection as well as facilitating carburetion through proximity to the heat thrown off by the cylinder. The intake pipes are well designed, being free from bends, and the main member is supported by an adjustable brace bolded to the upper crankcase. The vaporizer is readily accessible for cleaning, adjustment, etc.

Fixed Ignition Employed.

A true high-tension magneto is employed for ignition, eliminating the battery, coil and numerous wires, and by it the motor may be started on a quarter turn of the starting crank. It is mounted upon the upper half of the crankcase or inspection plate, a special base being incorporated in the design. This inspection plate is provided with a large filler cap for replenishing the supply of lubricant in the crankease and the part may be removed easily and without disturbing



The Power Plant of Mora Delivery Car la Noticeable for Simplicity and Accessibility.

the water pipes, intake members or other components. The magneto is gear driven off the cam-bald. Proper meshing or timing of the gears is possible through the design of the upper crankease, it being made in two sections, one of which fits over the driving gears. By removing two nuts these members may be seen plainly.

The magneto is of the fixed spark type, the company maintaining it provides maximum efficiency, simplifies the operation of the car and prevents damage to the motor through improper use of the spark lever. With this system but one lever is mounted upon the steering wheel, the throttle member. The spark plugs are vertically located between the valves and petcodes are fitted to each cylinder for priming purposes, etc. The valve caps are very accessible, making it an easy matter to grind valves when these members require attention.

Believing that the planetary transmission is best suited to cars operated by inexperienced drivers, the company equips the chassis with this type, a design providing two speeds forward and reverse. The elutch, jackshaft and transmission are a unit and the latter is inclosed in an oil tight. weather and mud proof case which is provided with a large inspection plate. The clutch is of the multiple disc type, operating in a bath of Inbricant and is readily accessible and easily adjusted.

Drive from the motor to the jackshait is by shaft, provided with a large and well designed universal joint an either end. Final drive is by double roller chain of ample dimensions and means are provided for alignment of the rear axle. The gear ratio is such that a speed of 15 miles an hour is obtained. The company, however, will fit gears to meet the working conditions of the purchaseer, as all parts are interchangeable.

Rear and Front Axles.

Both front and rear axles are steel drop forgings, the former being 1.5 inches square and the rear 2.25 by 1.5 inches. The alignment of the rear member with the jackshaft is secured through two ample, tapered 1 beam members, which rods serve as brake hangers and anchors.

The frame is of pressed channel steel, 140.5 inches long and 34 wide. It is thoroughly braced by cross members and a tierod in front, the latter serving to retain the starting crank. The wheelbase is 94 inches.

Semi-elliptic springs are utilized both front and rear, the company stating that the type is the most logical for commercial vehicles in that they care for a heavy load transported over rough roads. The springare constructed of a specially treated high grade steel and so secured that vibration is absorbed, yet are staunch enough to withstand severe shocks occasioned by heavy loads.

The brakes are of the internal expanding type located inside the spockets on the rear wheels. They are operated by a pedal, and a hand lever is provided for emergency and for locking the brakes when stopping or on a steep grade. The diameter of the brakes is 10 inches and face 2.5, providing ample braking surface.

Wheels and Tires.

The wheels are of the artillery type and the hulsand hub flanges are liberal in size and designed to withstand secret service. Ball bearings of ample diameter are employed. When solid tires are fitted 36 by twoinch members are provided in front and 36 by 2.5 inches in the rear, although tress 36 by 2.5 inches front and 36 by three rear are listed as extra. Pneumatic



Open Express Wagon Type of Hody Providing Ample Carrying Capacity lickind the Drivers' Sent.

shoes, 34 by four inches, are optional equipment.

The steering gear is of the irreversible type and the steering column is fitted with a 16-inch wheel upon which is mounted the throttle lever. Left hand drive is employed, with high speed and brake levers at the right in the centre. The low speed and reverse are operated by pedal. The fuel capacity is 12 gallons, sufficient for considerable service. The equipment comprises two oil side lamps, tail light, horn and tools,

In the matter of details the company has been very particular. Lock washers and cotter pins are employed throughout and Inbrigation of parts subject to wear has not been overlooked. Grease caps are fitted to all components and 29 of these members are disposed at convenient places on the chassis.

The company manufactures a wide variety of standard bodies to meet the requirements of different industries. The dimensions of the express and stake bodies are 80 inches long and 45 inches wide. In addition to standard bodies the company is prepared to build special types to meet the needs of the purchaser.

The Mora commercial car is rovered by a liberal guarantee and the maker states that with reasonable and proper care it will withstand and give satisfactory service under a 25 per cent, overload,

ADVANTAGE OF TRAILER

Some Suggestions Resulting from Recent Test of La-France Hydraulic Truck.

An accompanying illustration shows the LaFrance gasoline-hydraulic truck, distributed by the Hydraulic Truck Sales Company, 1777 Broadway, New York

City, in a recent test in Jersey City, N. J., in which the sixton truck was loaded with six tons and in addition hauled a trailer carrying nine tons, making a total load of 15 tons. The truck weighed 4.5 tons empty and the trailer four tons. This entire load was hauled up a 10 per cent, grade, the truck being stopped on the grade twice and started again, each time without difficulty.

As a result of this test and others which have been conducted of late in order to demoustrate the value of the truck and trailer combination, it is suggested that several interest-

ing points have been brought out. In the first place it is held that the cost of operating a truck is governed by the following factors: Interest on the investment, depreciation, insurance, garage expense, chanffeur's salary, gasoline and oil and tires.

With a six-ton truck operating and carrying six tons, these may be regarded as fixed charges. But by using a six-ton truck and hauling in addition a trailer carrying nine tons, for instance, the load capacity of the equipment is increased materially. The Hydranlie Truck Sales Company suggests that the above factors are affected by this combination in the following

The cost of the trailer being only about 10 per cent, of that of the truck, the items of interest and depreciation are increased only in proportion to the cost of the trailer. The insurance item is divided into two classes, fire and accident, the latter including collisions, property damage and liability. By the combination the second class is not affected at all, and the first is increased only in proportion to the cost of the trailer. The garage expenses might be doubled, since it is conceivable that a nine-ton trailer would take up as much room as a six-ton truck. The salary of the chauffeur certainly is not going to be any more. As to the cost of gasoline and oil, and tires, there is a lack of definite data, but the experiments thus far conducted would seem to indicate that this item would



InFrance Casoline Hydrautic Truck Hauting Trailer with Combined Lond of 15 Tons.

not be increased to a proportionate degree.

The company maintains that using a trailer will materially decrease the cost of hanling goods. It is further claimed that the hydraulic transmission utilized in these trucks affords a tremendous tractive effort and that this factor makes the LaFrance the logical truck to use for handing trailers. It will be noted that in the test described berein the truck was not overloaded, the Hydraulic concern believing that it is poor practise and that the only proper method of increasing the load is by utilizing a trailer as outlined.

Three KisselKars, made by the Kissel Motor Car-Company, Hartford, Wis., in service with the Golden Rule Department Store, St. Paul, Minn., average 47 miles a day, while one of them covers 62 to 65 miles in suburban delivery and makes more than 200 stops. The figures show a substantial saving in the cost a package for delivery, while the range of trade has been extended greatly.

FIFTEEN TONS AT A LOAD.

Martin Tractor Demonstrates That It Is Able to Handle Large Truck with Ease.

Herewith is presented a photograph of a 15-ton ash wagon recently designed and constructed for the Borough Development Company, Brooklyn, N. Y., which is drawn by one of the Knox Antomobile Company's Martin tractors. The wagon is 12 feet in height and the combination is 26 feet long, making what is believed to be one of the largest pieces of motor equipment in the world.

The body proper is designed to take 15 tons of ashes at a load and to withstand a speed of eight miles an hour. The wheels are shod with steel tires, which will be utilized until snow makes its appearance on the ground, when the front wheels of the wagon, the drivcould deliver but one load a day, carrying four tons at a cost of \$7.50 a trip. The truck carries 25 tons of brick each day, or the equivalent of the work formerly done by six teams, with an expense of less than \$20 as compared with \$45 for the latter.

FIFTY MILES WITH KISSELKAR.

Covers Numerous Grades Over the Roads to the Berkshires in 12 Hours.

That the motor truck is to supersede the horse, or even the railroad, in hauling merchandise and household goods across country within a reasonable distance, is a fact which is beginning to make itself felt with those who are engaged in the general transfer business. Numerous instances of such work blave



Martin Tracior Hauling 15-Ton Ash Wagon, a Combination Recently Constructed for the Borough Development Company, Brooklym, N. Y.

ing members, will be shod with rubber for winter wear. The heavy load, however, is to be carried on steel at all times.

A large number of these Martin tractors are at work in different parts of the country, some drawing from six to 12 tons of coal, lumber or other merchandisc, while still others are attached to ladder trucks, water towers or steamers in fire department service. The 15-ton ash wagon is said to be the largest load one of these machines has been called upon to handle, and its success on the Brooklyn equipment is held to be indicative of its ability in the future.

A saving of about \$25 a day has been made by W. G. Thomas, a Detroit contractor, by the substitution of a G. M. C. three-ton truck for horse drawn wagons. Mr. Thomas is compelled to had brick 7.9 miles a day. He tried horses at first and found that each team

been brought to light within the past few months, and in nearly every instance it has been demonstrated that the mechanical transport can accomplish the task to better advantage and at less expense than either of the other methods mentioned.

The Albany Tracking & Storage Company, Albany, N. Y., has a four-ton KisselKar truck, made by the Kissel Motor Car Company, Hartford, Wis., which it has been utilizing in transfer work for some time past. As has been true with many other transfer companies it has found the car of inestimable worth whenever it has been necessary to employ a transport for so-called long distance haulage.

Recently the concern was called upon to deliver an accompany of the deliver and some 50 miles. The way leads over some of the most difficult hills among the Berkshires, and a large portion of the outward journey was up-grade.



Four-Ton KlaselKar Truck in Service with the Albany Trucking & Storage Company, Albany, N. Y., in General Transfer Work,

The round trip was made in a little less than 12 hours, which indicates the possibilities in quick transportation with motor vehicles.

PEERLESS IN LUMBER WORK.

Two Vehicles of This Make Supplant Several Horses in Hauling Logs to Mill.

Within the past year or two, itinerant lumber men, the woods of New England and the East, have been turning their attention to the motor truck, and in several instances these vehicles have demonstrated that they may be relied upon to present figures of economy and efficiency in a field in which it might be supposed that the horses would eved. The cars are utilized not only for handing the logs to the mill and lumber to the railroad, but in transporting the mill from one seeme of operations to another.

An instance of this nature is cited in the experience of Charles II, Phillips, Plainfield, Coum, who has two Peerless trucks, made by the Peerless Motor Car Company, Cleveland, O. One of these was purchased in October, 1911. It covered 50 miles a day over the comparatively unimproved forest reads and did the work of from eight to 10 horses. The result in economy was such as to indicate the wisdom of the change and a second machine was ordered. Several very steep grades, with soft surfaces, are surmounted regularly by the trucks and without difficulty. Thus far there has been practically no repair expense, according to the information available.

Instead of entring the tree trunks into the usual log lengths, it will be noted by an accompanying illustration that the practise is to leave them intact. Two or three such trees, with the branches trimmed off, are carried at a load, One end is placed on the truck loady and the other on a pair of trailing wheels, as shown.

Garfords in Livery Service—Fiften 40-horsepower Garford limousine cars, made by the Garford Company, Elyria, O., have been ordered by the Washington Motor Livery Company, Chicago, for immediate delivery to be put in service in that city as soon as they can be completed and shipped. This is the fourth motor livery concern of the Windy City which has adopted the Garford car exclusively for taxicals service. When the order shall have been filled there will be 128 Garford machines in Chicago's livery service, representing, it is claimed, an investment in excess of that of any other one attomobile concern in Chicago.



One of the Peerless Trucks with Lumber Service with Charles H. Phillips, Plninfield, Cann., Shawing Method of Hauling Logs.

THE CAR SHORTAGE PROBLEM.

Solution of the Difficulty Lies in Growers Replacing Horses with Motor Trucks.

With the increase of the use of motor trucks throughout the country in various branches of business, it is thought that much of the shortage of railroad freight cars, so pronounced at this senson of the year, will be chiminated. It is surprising in view of the fact that the railroads have iron year to year increased their rolling stock, that there should have been a shortage of 12.412 cars to band the bumper crops of the West this year. Yet this was the fact and it undoubtedly was due to the slow loading and unboading of freight. Shippers, anxious to make quick collections, have sent many cars only half loaded when they might have carried full loads had the quicker method of transporting their problem by a more truck been

between shipper, railroad and consumer, and the unit in giving the commercial world prompt, profitable results.

SAMPSON VS. ARMY MULE.

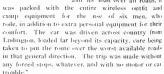
Light Delivery Wagon Performs Good Service with Signal Corps in Michigan.

One result of the recent manuscures of the Michigan National Guard, in the vicinity of Ludington, was the satisfactory service performed by a 1800-pound Sampson wagon, made by the Ablen Sampson Manufacturing Company, Detroit. This gar was placed at the disposal of the signal corps, and according to First Lient. R. I. Gandy of that command, it supplanted 10 horses and four pack miles. He adds: "At best the mobility of such a unit does not average over 20 miles a day, while the same distance is an hour's comfortable

> work for the section transported on the Sampson truck." His report continues:

"The machine was ready for instant use during the entire 10 days and was operated over all sorts of roads. The loose sand in the vicinity of Ladington is certainly as impassable as anything to be met with in average field service. and even across country. throngh untouched undergrowth, the car carried the men and equipment at the order of the signal corps ofheers. At no time did the officers choose favorable routes for the truck.

"To complete the test and give the officers assurance that the truck would handle itself and its load over all roads, it



Express Company Adopts Trucks—The management of the People's Express Company, which transacts business between Amesbury, Newburtyport, Ipswich, Essex and Boston, Mass., has recently added four large motor trucks to the company's equipment, all of which run between those points and Boston at a saving in time of delivery and cost of operation.



Sampson 1500-Pound Wag on, Londed with Signal Carps, Mirbigan Vallonal Guard, in Recent Milliary Manocuters.

adopted instead of using horse drawn methods,

There has been much talk about the need of cooperation between railroads and shippers, but the motor truck appears to be the co-operation to relieve this traffic condition and the shortage of freight ears during the rush season. Many freight cars have been treated as a storage warehouse, being left loaded for a day or two because the shipper has not had rapid means of hanling. The commercial motor vehicle will solve this, because it can haul full loads in quick time, The ton, three-ton and heavier types of trucks will overcome all difficulties for the shippers of heavy wares. 'There will be an increase of business by all concerns, the radroads will get better value for their rolling stock; they will deliver more goods and the general conditions as far as getting goods to the consumer promptly, will be better. It is the co-operation of the motor truck which is the real connecting link



Manicipal Service Equipment



0-1400 00 00 00 00 0000000

THE TIRE QUESTION.

Goodyear Company Claims to Have Solved the Prob-

According to F. H. Sawyer, head of the fire truck department of the Goodycar Tire 8. Rubber Company, Akron, O., the importance of marketing a suitable solid tire for moor driven fire apparatus is apparent when it is known that the interval between the sending in of an alarm and the arrival of the apparatus is the determining point in such service. He adds that the effect of vibration caused by the increased weight and speed of fire apparatus over that of the ordinary commercial vehicle, causes a big increase in wear and tear of tires three times the speed producing approximately mue times the wear and tear, according to his figures.

As a result of his investigation the experimental department of the Goodyear Company has developed what is known as the Goodyear cushion fire truck tire, which has been used with success for some time. Briefly described this tire possesses a dual tread, thereby providing a phable construction that is readily distorted. The sides are so modded as to produce immerous pockets, which are separated by inclined partitions or bridges, the latter acting as Ininges and permitting

a natural displacement of the rubber. The pockets also are held to provide the necessary space for the hinged action of the bridges and for the displacement of the rubber.

An accompanying illustration shows two Webb combination pumping engines and hose wagons, in service with the United States government in Panama. These are empiped with the new Goodyear tire and are said to have given splendid satisfaction under the peculiar conditions which exist on the isthmus.

AMBULANCE FOR BRIDGEPORT,

Every Convenience of Physician and Patient Have Been Considered in the Construction.

A private authulance, to be at the disposal of all the officials of the city, has been purchased at Bridgeport, Coun, by James T. Kourke, former member of the board of public charities. The ambulance will be at the service of physicians night and day. The chassis is a Locomobile tyre L.

The body is mounted upon special springs and the interior is fitted with an ample cot and two collapsible chairs for nurse and physician. Electric lights are generously distributed both inside and out of the machine. A handy arrangement of switches places all



Two Webb Combination Chemical Wagons and Pumping Engines in Service with the United States Government in Panama.

and Fit(ed with Good) ear Cushion Fire Truck Tires.

within ready control and the ambulance is a fine illustration of perfection of the automobile builder's art.

POPE-HARTFORD CHEMICAL WAGON.

Somewhat Novel Type of Fire Apparatus Constructed for Use in California.

A piece of motor driven fire apparatus which is somewhat unusual in its appointments is that which was completed recently for the department in San Francisco, by the Pope Manufacturing Company, Hartford, Conn. It is termed a chemical wagon, and carries no water hose and no squad of men. The crew is limited to those who will have charge of the two chemical tanks.

As will be noted from the accompanying illustration, the two tanks take up the whole space usually reserved for hose or men and their fire fighting equipment. Each of these is of 80 gallons capacity and they rapid succession between noon and 4 in the afternoon, necessitating such rapid response on the part of the department that the apparatus on several occasions did not have time to return to the engine houses between calls.

"The total mileage for the two days' fires from the main fire headquarters was over 50 and with the thermometer hovering around the 90's on both days, one can readily imagine what would have become of Springfield if it had been dependent upon horses to pull its apparatus. Although several of the fires were situated in dangerous localities, each one was reached and put out before it had time to assume serious proportions and so promptly were they handled that no second alarm was necessary throughout the two days of strennous work, and practically all of them were put out with chemicals without the assistance of a drop of water.

"This result, in my opinion, is a strong testimonial to the automobile fire fighting apparatus and particu-



Pope-Hartford Chemical Wagon, Made by Pope Manufacturing Company, Hartford, Cona., and Recently Installed in San Francisco, Cal.

and damage."

are accompanied by 250 feet of one-inch hose. The machine is designed for quick work in rushing chemical apparatus to fires with all possible dispatch. In the preliminary test the vehicle travelled at the rate of 55 miles an hour.

EFFICIENCY OF MOTOR EQUIPMENT.

Chief Daggett of Springfield, Mass., Presents Interesting Conclusions Respecting Results Obtained.

An example of the speed, reliability and efficiency of motor driven fire apparatus is shown by the recent report of Chief W. H. Daggett of the fire department in Springfield, Mass,, concerning the results obtained in that city July 4 and 5. He says in part:

"On the Fourth we had a total of 18 alarms, which were scattered all over the city, while on the 5th 12 alarms were rung in, of which half were received in

its incipiency with the smallest possible property loss DUSTLESS MOTOR SPRINKLER.

larly of the effectiveness of the anto-chemical on ac-

count of its great speed and ability to choke a blaze in

Street Department in St. Louis Is Testing Novel Production Fitted to Saurer Chassis.

The city of St. Louis, Mo., has begun operations with a dustless motor sprinkling apparatus, equipped with a tank of 1400 gallons capacity and mounted upon a 6.5-ton Saurer chassis, made by the International Motor Company, New York City. The nozzles are made adjustable so that the quantity of water thrown ont and the distance it is thrown can be regulated by the driver to suit conditions.

The nozzles are forward of the sprinkling wagon

instead of in the usual place in the rear. This is so that the truck itself would not cause the very evil it was designed to cure. The forward position of the spraying apparatus waters the streets in advance of the wheels, so a cloud of dust is not raised as a preliminary to the dust laying.

ONLY ONE BIDDER.

American-LaFrance Company Would Supply New York City with 28 Additional Motor Fire Engines.

In his estimate for the coming year Fire Commissioner Joseph Johnson of New York City asks for \$11, 290.157. Included in the expenses this amount is expected to cover are 1000 additional firemen to man 42 mew stations that are to be enuitoned with motor driven

WANTS FORTY VEHICLES.

New York's Street Department Asks for Appropriation for Garbage Disposal and Sprinkling.

Commissioner Edwards of the department of street cleaning in New York City is seeking a method whereby he can secure a permanent and much larger motor equipment for his department. Mr. Edwards has experimented somewhat extensively with motor driven apparatus and is much pleased with the results thus far obtained.

In his estimate for 1913, submitted to the budget committee of the city government, he requests an appropriation of \$210,000 to be expended in the purchase of 40 motor trucks to be used for garbage removal and in street sprinkling. The also wants \$20,000 for the installation of self-propelled street sweeping machines,



Forty Horsepower Warren Bondster, Converted Into Chief's Wagon for Deputy Chief Sullivan of the Department in Washington, D. C.

vehicles. There are now 19 pieces of fire fighting apparatus of the automobile type and it is contemplated to add 87 more machines before next summer. The contracts for most of them already have been let.

When Commissioner Johnson recently opened the bids for 28 automobile fire engines, soon to be added to the metropolitan department, be found that the American-LaFrance Fire Engine Company, Buffalo, N. Y., was the only bidder. The engines required are to have a pumping capacity of 850 gallons of water a minute and the specifications called for gasodine driven Christic tractor with steam pumping engines. The bid of the LaFrance company was \$8800 per engine, 15 to be delivered in five months and the balance in eight months. Fire department officials expect that the gasoline propelled engines will prove an advantage in the districts where the runs to answer fire alarms are over a considerable distance. The department recently received a special appropriation which is being used for the rental of a number of motor trucks for demonstration purposes. It is the purpose of Commissioner Edwards to try out a number of types of machines before making any recommendation for the purchase of a particular make of motor truck.

WARREN FOR WASHINGTON DEPARTMENT.

City Also Has Its First Fully Equipped Motor Fire House Ready for Service.

An accompanying illustration shows the 40 horsepower Warren roadster, constructed especially for Deputy Chief Sullivan of the fire department in Washington, D. C., by the Warren Motor Car Company, Detroit. The machine was purchased after keen competition among a number of manufacturers. It is finished in solid red and is equipped with a Newtone horn, an immense gong in front and an ordnary automobile horn over the radiator. On its initial test it demonstrated its ability to run 65 miles an hour.

The District of Columbia also is experiencing the novelty of having its first fully equipped motorized fire station, Chief Frank J. Wagner recently turning over to Engine Company 24 two pieces of such equipment. The house is located in the suburban section, where it is expected that the machines will show to the best advantage. Among the other new equipment of this nature is a pumping engine and combination chemical and hose wagon.

BRIEF ITEMS OF GENERAL INTEREST.

Ambulance for Washington, D. C.—A motor driven ambulance is the latest addition to the fleet of municipal machines being operated by the city of Washington, D. C. The car is being used by the emergency hospital and is the gift of a former woman resident of the Capital. It is finished in battleship gray, with bird's eye maple interior and red upholstery, and has all the latest hospital equipment.

Five More Patrols for Pittsburg.—The officials of the department of public safety in Pittsburg. Penn, have contracted for five more automobile patrols. This is the second order for five machines given within a short time. Those already in service proved so satisfactory that the second order was determined upon. The first was placed in commission Aug. I and within three months the old horse vehicles will be a matter of past history.

Knox Water Wagon—The Springfield, Mass, water department has put into service a new three-ton Knox truck, made by the Knox Automobile Company of that city. The vehicle is equipped with a convenient type of body, suitable for hauling heavy pipes of all sizes, as well as men and tools or general supplies. The motor is rated at 40 horsepower and is expected to have ample power to negotiate all the hills encountered in its wide range of territory.

Buicks in Service in Boston—The city of Boston recently added three Buick cars for the centerry, paying and lamp departments, the machines for these departments having big mileage capacity. At least two of the Buicks in the Boston city garages have travelled upwards of 100,000 miles, giving excellent satisfaction. An present machines of this make are used in the following city departments: Fire, street, wire, bath, park, sehool, light and sewer.

Two White Insurance Patrols—The fire patrol committee of the New York board of fire underwriters has placed an order with the White Company, Cleveland, O., for two additional gasoline propelled patrol

cars. One is for the borough of Brooklyn and the other is for the borough of Bronx.

Schacht Combination Wagon—The city of Newport, Ky., has made the purchase of a motor hose track of the Schacht Motor Car Company, Cincinnati. The machine is a combination hose and ladder truck and is giving daily service. So enthused are the Newport authorities over the efficiency displayed by the vehicle that they are contemplating a speedy and complete motorization of their entire fire fighting equiponent.

Victor Seeks Big Order—The city council of East Leviperpool, O., is considering the motorization of the fire department. C. M. Miller of the Victor Motor Truck Company, Buffalo, N. Y., submitted an estimate to equip the department with one triple combination engine, a chemical engine and hose eart, an aerial truck and the work of converting three chemical wagons to motor propelled vehicles, all 100 horse-power machines, a motor truck patrol and a special car for the chief, the latter being of 50 horsepower.

Segrave with Tractor Device—The Seagrave Conpany, Columbus, O., has delivered to Chief Louis Behrens, Charleston, S. C., a motor combination chemical and hose cart, with tractor device, which has been placed in active service at the central station.

White for County Official—The commissioners of Mlegheny County, Penn., have awarded a contract to the White Company, Cleveland, O., maker of the White truck, for an automobile truck to be used by the county sealer of weights and measures. The machine is to be of the wagon type and is to be used in carrying the equipment of the official in his trips about the county to test scales and measures.

American-LaFrance for South Carolina—The fire committee of the Gaffney city council, Gaffney, S. C., has awarded a contract to the American-LaFrance Fire Engine Company, Elmira, N. Y., for an automobile fire truck and hose wagon, both to be equipped with chemical engines and to be delivered by March I.

Pumping Engine for Bridgeport—Bridgeport, Count, has purchased a new gasoline pumping fire engine at a cost of \$10,000. The engine is rated at 126 horsepower and is capable of driving the machine at a speed of 40 miles an hour.

In the Market—Following are some of the cities which are contemplating the purchase of motor driven fire apparatus: Johnstown, Penn.; Champaign, Ili; Janesville, Wis.; Macon, Ga.; Pasadena, Cal.; Springfield, O.; Providence, R. I.; Columbus, O.; Owensboro, Ky.; Belmont, Mass.; Muscatine, Ia.; Newark, Del.; Harrisburg, Penn.; Davenport, Ia.; Fresno, Cal.; Wilmington, Del.; Wichita, Kan.; Hallettsville, Tex.; Flint, Mich.; Akron, O.; Spokane, Wash.; Norristown, Penn.; Ogdensburg, N. Y.; New Bedford, Mass.; Minneapolis, Minn.

New 6mmercial ar Accessories.

Hardy Spark Plug Tester.

The Hardy spark plug tester is the product of the R. E. Hardy Company, Austin avenue, Chicago. It is designed to make easy the location of a faulty plug and to protect the workman from possible shocks. The handle is of insulated material to which is fitted two metal strips which are placed in contact with the shell and terminal of the plug, and the current passes to and across an adjustable gap with which the instrument is provided.

Sypher Magnetic Lifting Tool.

The Sypher Tool Manufacturing Company, 2208 Waren street, Toledo, O., is manufacturing the Sypher magnetic lifting tool, a device for service in the garage and repair shop. It is 12 inches in length and the magnets are operated by dry cells or a storage battery. It is actuated by a press button on the handle, thus closing the circuit and but little current is consumed.

Alco Lighter.

The Alco lighter is marketed by Chas. E. Miller, 97-103 Reade street, New York City, and its design is such that it is attached easily to the base of an acetylene burner. By it the gas may be lighted by the pressing of a lever, the movement actuating friction material, causing a shower of sparks in the path of the escaping gas. The tip is the well known Alco and throughout the mechanism is sturdily constructed.

Allen Friction Wrench.

The Allen friction wrench, manufactured by the Allen Wrench & Tool Company, 4-Meadow street, Providence, R. L. is as the name implies a device operating on the friction principle and is free from springs, teeth, etc. The inventor claims that its grip is instantaneous and that its design is such that it may be employed in smaller spaces than the usual ratchet member. The wrench comes in a neat box containing sockets of different sizes, a short and long extension, screw driver, universal joint, etc.

Gun Metal Finish.

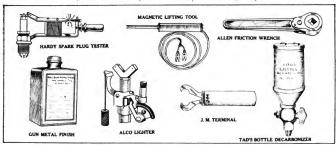
Gun metal finish is marketed by the Gun Metal Finish Company, Decatur, Ill., and is a liquid contained in a small can, employed for converting the brass or copper of the lamps, etc., into a dull finish. It is applied with a brush after the part has been thoroughly cleaned and the maker states it will dry in 30 minutes. If a gloss is desired it is secured by treating the surface with linseed oil and rubbing with a soft cloth.

Tad's Bottle Decarbonizer.

The Toledo Auto Devices Company, Toledo, O., is marketing Tad's bottle decarbonizer, which comprises a bottle shaped member for attachment in place of the spark plug on a motor and a fluid. The device is employed when the engine is running warm and the maker claims that four ounces of the material will effectually remove carbon and other deposits from the motor. The bottle is equipped with a screw adapter and a gas tight valve and is attached easily.

I-M Universal Terminal.

The J-M universal terminal is marketed by the H. W. Johns-Manville Company, New York City, and a quality of the device is that it may be employed with any type of spark plng, being secured and detached without the use of tools. It has a pair of elliptic brass jaws which are expanded and contracted by simply turning a fibre sleeve. The secondary wires are attached easily by a special construction and the maker points out accidental breaking of the threading device does not incapacitate the terminal, as proper contact can be secured through the jaws.



Mastrating Some of the More Recent Accessories Applicable to the Commercial Vehicle, Garage and Repair Shop.

WITH THE PIERCE-ARROW IN WAR MANOEUVRES.

S OME interesting figures are revealed as a result of the trip of the fix-ton Pierce-Arrow Worm driven truck, made by the Pierce-Arrow Monto Car Company, Buffalo, N. Y., from that city to the recent military manocuvres in Connecticut and return, as well as its service during those manocuvres. Undoubtedly the greatest interest attaches to the figures for gasoline consumption, and by reference to the accompanying table it will be found that this worked out at 4.63 miles to the gallon on the outward trip, 4.42 on the homeward journey and 2.6 during the manocuvres.

There is a slight apparent discrepancy in these figures, by reason of the fact that the gasoline listed was that put into the tank on the dates specified, and it would appear that there was at least sufficient fuel remaining upon the arrival in New Haven to take the truck to the camp at Tyler City, return to New Haven and make another joinney to camp before additional port army equipment such a long distance—practically 500 miles—over the road to the scene of the nanocurres. A journey of that distance would be equialent to a trip across the entire length or breadth of almost any European country that has been at the forefront in motor truck experimentation for military purposes.

A goodly portion of the road, both going and oming, was over state macadam, but some of the highway conditions encountered were by no means ideal. The Pierce-Arrow took them as they came, and during the actual manoeuvres back roads were used almost exclusively.

It was known before the truck left Buffalo that difficulties would be met and it was prepared for field work insofar as foresight and engineering experience could equip it. What is regarded as the most valuable of the extra equipment were the four heavy planks, 14



Regimental Camp Served by Five-Ton Pierce-Arrow Worm Driven Truck During Recent Military Manocuves in Connecticut, Indicating Character of Granud Over Which Vehicles Were Forced to Pick Their Way.

fuel was taken on. This would have the effect of increasing the mileage on the outward trip, and still further reducing that made during the manoeuvres. This same situation does not appear to have existed when the homeward journey was begun.

In connection with this situation the report of the Pierce-Arrow company has the following to say: "The frequent halts, while in train formation, of course, made the gasoline consumption much higher during the actual manceurres than would have been the case in uninterrupted road work, or in commercial work. One fact that worked against fuel economy was that all of the road halts were of indefinite length, and the notor would be kept running until it was seen that the delay would be more than momentary. Another factor was the great amount of low gear work on sandy and bad roads, and aeross fields:

The performance of the Pierce-Arrow is of particular moment, because it undoubtedly is the first time that a motor vehicle has been called upon to transfeet long, 12 inches wide and two inches thick. Two of these were carried on either side, and there was no day the truck was on the road that they were not used. Bad enliverts were crossed by their aid, and they were laid frequently across weak bridges to distribute the strain that ordinarily would fall on a few floor boards and one set of stringers. On one occasion three beards were used by the whole army train of a dozen vehicles.

On the left side of the car a winch was mounted, connecting with the shaft running between the elutch and transmission. This was used on two occasions, but then more as a test of its adaptability than as an actual means for propulsion.

Mounted on the dash was a searchlight. This, it was expected, would be employed altogether in lighting the road for night running, but on the first day of the manoeuvres another use was found for it. During the unloading of the truck at night in the field the men had been forced at other times to work with one hand



With the Pierce-Arrow in the Pield: A. Method Employed for Protecting Bridges and Culverts; B. Right Side of Truck, Carry lng Saldiers Whn Preferred Riding to Hiking; C. Baggage Detail Makes Quick Work of Picking ap Planks.

and arm, utilizing the other for holding a lantern. When the searchlight was turned to bear upon the load the men could use both arms for the work.

A spare wheel was carried under the rear of the body, but this was not needed, and consequently remained where it was fastened from the time the car left Buffalo until the return.

"Numerous lessons were drawn from the use of trucks in the recent manoeuvres" reads the report, "the most important of which was that the efficiency of the motor truck suffers to such an extent when compelled to travel in any army train with mule drawn wagons as to render it of little more value than its equivalent in carrying capacity in wagons. When entrained with the wagons, as was considered necessary in order to keep the entire supply train intact and nnder guard, the better to resist attack by the enemy, the trucks were forced to limit their speed to that of the mules. While on the road in train formation, stops were frequent, and owing to the narrow roads in the country traversed, as well as to the train formation, it was impracticable for one portion of the train to pass another. On one occasion the Pierce-Arrow was forced to stop more than 50 times in one day's march, These stops varied in length of time from a few minutes to over an hour, the whole day's travel being no greater distance than could have been covered by the truck, if its progress had been unrestricted, in two hours at the most.

"Army trucks, to be successful, must be especially equipped for their work, as was shown conclusively. Planks are an absolute uccessity. In addition to those carried by the Pierce-Arrow there could have been used two others, four feet long, 12 inches wide and two inches thick for bridging short spaces.

"Among the other recommendations made by an observer were these: A which so situated that it may be worked through snatch blocks in any direction; strong eye holds for carrying snatch blocks for the winch line; two jacks that are quick acting and with a step that is near the ground tan even better plan is a trip of carrying a long extension lever for use in prying; a drawbar that carries an eye holt or coupling that would prevent wear or cutting of the cable used; a swivel type searchlight; shovels and axes so placed that they are not in the way of the load but where they are accessible for instant use in no matter what position the truck may be thrown, and a double block and tackle with 100 feet of rone.

"Suggestions have been made at various times that when a number of army trucks were in train, a valuable adjunct would be an engineering truck that would carry men and tools for repairing bridges and culverts and patching up bad spots in the roads. The observers



With the Pierce-Arrow En Ronte: A, Road Canditions in New York Sinte, Where it Was Possible to Make 147 Miles a Day; B,
Left Side of Truck Londed as Sapply Wagon; C, One of the Narrow Roads in Cannecticut.

who were on the Pierce-Arrow, however, do not approve of this idea. They hold that each truck should carry its own equipment for meeting such emergencies. Should reliance be placed on an engineering truck, they hold, the chances are that owing to the narrow and often times conjested condition of the roads, it would not be able to reach the seat of the trouble, or if it did the delayed truck would have freed itself already."

TABLE OF TRAVEL AND OIL CONSEMPTION.

		Huff	nle to N	ew Have	·n.		
					Gals.	Q1s.	Libs.
	Buffalo to	Miles	Hours	MPH	Gas	011	Load
	ochester	NO.	8.75	9.14	20.5		7.776
5 83	racuse	102	14.50	7.02	24.0	6	5.000
6 A1	bany	147	17,50	8.49	32.0		5,000
7 L	e	48	8.25	5.82	5, 0	1	8,000
8 Ne	w Haven	111	14.75	7.53	24.0	3	8,000
		Durin	g War 1	lanoeuv	res.		
9 T3	der City	12					8,000
	w Haven	23					6,000
	w Haven*	21			13.0	2	2,600
	unge Center*	20					6,000
	w Haven				15.0		2,000
	hile Hills	32			10.0		11,666
	ew Haven'	38			12.0	2	2,000
16 Oz	ford	30			10,0		14,000
	hite Hills	11			17.0		14,000
	tsford*	14					5,000
19 De	rby*	8			12.0	1	2.000
		White	e Hills	to Buffs	ilo.		
	ringfield	79	10.00	7.90	20.0	6	6,500
	bany	94	11.00	8,54	12.5		6,500
22 U	lea	97	10.25	9.40	30,5	3	6,500
23 At	aburn	80	9.00	8,88	1.0		6,500
	ochester	71	8,60	8,88	18.0		6,500
25 B	affalo	97	5,00	16.88	19.0	3	6,500
				-	-	410	
To	tals	122×	* * * *		309.5	27	

^{*}And return.

IMPORTANT TRUCK CONSIDERATIONS.

Record of the Product and Responsibility of the Manufacturer Factors in Making Decision.

George A. Kissel, president of the Kissel Motor Car Company, Hartford, Wis., maker of the KisselKar trucks, recently told what he considered the all-important elements to be considered in the purchase of a motor truck. "The first is the construction and record of the truck." he said, "the second is its adaptability to the particular duty required of it, the third is the permanency and responsibility of the manufacturer and the fourth is the facilities to give thorough service after the sale. Upon the construction of the truck depends its record. A truck manufacturer, who offers a good product, ought to be able to give convincing references as to its performance. Its adaptability also should be determined from these references and the additional data the manufacturer can give.

"The responsibility of the manufacturer is easily ascertained. That brings us to the question of service. Accidents may occur to trucks as well as to horse drawn vehicles and expert service should be as accessible in the one case as is the blacksmith or veterinary surgeon in the other. Service in the motor industry means prompt and skillful attention to the mechanical needs of the truck. It should be backed up with an organization that knows every nut and bolt in the truck and is equipped with the parts to insure immediate replacement."

HILL CLIMBING ABILITY.

Peerless Company Demonstrates That It Has Solved the Problem in Satisfactory Manner.

According to an official of the Peerless Motor Car Company, Cleveland, O., the secret of building a powerful truck that will carry heavy loads up steep hills or over soft roads, does not lie in equipping it with a large engine, but in arranging the weight of the truck so that there shall be ample traction and the driving wheels will never slip. "When 80 per cent, of the weight is carried on the rear axle," he said, "that lightens the load in front and makes it possible to use more flexible springs there. Jobs are dissipated and the life of the truck mechanism is lengthened.

"The Peerless truck attains astonishing power on the hills through the fact that it is designed in this way. Not long ago a prospective purchaser asked the representatives of half a dozen of the best trucks to attempt the Plumb street hill at Morristown, N. J., with their trucks under full load. The hill has a 21 per cent, grade and the surface is soft dirt. Our four-ton truck, fully loaded, went up without faltering. Seven men were added and it went up again. Then it was stopped in the middle of the hill and went on again from a standing start. The Peerless was the only truck, with one exception, that made the grade,"

MORELAND ENLARGING FACTORY.

Maker of Distillate Truck Preparing to Care for Greatly Increased Business on Coast.

The Moreland Motor Truck Company, Los Angeles, Cal, maker of the Moreland distillate motor trucks, has begun an addition to its present factory in order to meet the demand of the Pacific Coast trade for its product. The trucks have steadily gained in popularity in California and the factory addition will permit of the construction of 500 trucks during the next 12 months. Besides greatly enlarging the present manufacturing space, the factory addition will also house the Moreland service department, that will give the most up-to-date service, night and day, to Moreland owners.

Twenty-six Moreland trucks were recently delivered. The product is being manufactured in sizes varying irom one to five tons. On the completion of the addition to the plant practically everything used in the construction of the vehicle, with the exception of the engine, will be manufactured in the Moreland shops.

THE SULLIVAN 1500-POUND TRUCK.

H AVING had 30 years of experience in the wholesale carriage manufacturing bussness, those connected with the Sullivan Motor Car Company, Rochester, N. Y., maintain that they are in a position to judge the needs of business men who require a light delivery motor vehicle. Two models are produced by this concern, one being designed for carrying loads of 1009 pounds capacity and the other, which is the newer of the two, for 1500-pound loads. The same general details of construction are carried out in both.

The motor is a two-cylinder, four-cycle, water-cooled unit with bore and stroke of 4.5 inches, and is rated at 18 horsepower. The cylinders are made of high grade material, carefully ground to size, and are fitted with two-inch diameter valves, made with cast iron head on steel stem. The piston and piston rings, of which there are four for each piston, are made of a specially fine grade gray iron. The wristpins are 1.0625 by 4.3125 inches, and are made of steel, case hardened

leaks or overheating. Cooling is still further aided by a fan located in the flywheel.

The clutch is of the cone type, equipped with a heavy spiral spring and ball thrust bearing. It has but one adjusting part and that is in sight at all times. It is claimed to be built for strength and durability, combined with simplicity. The transmission is planetary, the gears being 875 inch wide and made of the best grade carbon steel. They are box hardened and all surfaces are ground. The bearings are large in size and are made of the best bronze.

The frame of the model 31, or 1500-pound chassis, is of hot riveted angle steel, 2.5 by 2.5 by .3125 inches. The rear axle has 1.6875-inch spindles and 1.75-inch bed, and all spindles, hubs and ball bearings have been designed with an extra large factor of safety. The front axle has the same sized spindle and bed of 1.375 inches. Grease cups are provided on all wearing parts.

The front springs are full elliptic, half scroll, and



Model 51, 1509-Pound Sullivan Delivery Wagon, Designed by the Sullivan Motor Car Company to Handle Light but Bulky

and accurately ground to size. The wristpin bushing is of phosphor bronze, L0625 by two inches. The crankshaft is a drop forging, with front bearing 1.75 by 3.1875 inches and the rear 1.75 by 3.5 inches. The connecting rod is of steel, drop forged, and its bearing is 1.75 by 1.75 inches. All bearings are of special die cast habbitt, and all cams are ground to size and case hardened.

Ignition is by a Bosch magneto meanted on an aluminum case. The carburetor is a Schebler, with gravity feed. Labrication is by mechanically operated oiler, which pumps oil to each cylinder, to each of the main bearings and directly to each connecting rol bearing. The valve operating mechanism is lubricated by splash. The cooling system is by thermo-syphon, which is held to be decidedly efficient, inasmuch as it has been demonstrated many times that the motor does not overheat, even when put to severe tests in lot weather and over rough roads. The radiator also is of efficient design and has developed no trouble from

the rear members full elliptic, full scroll, auxiliary cross springs being located at this point. The brakes are equalized, internal expanding on rear wheel drums, 10 by 2.5 inches. Final drive is by side chains, of oneinch pitch, 6.25-inch roller and 5-inch width, every link a master link. The sprockets, front and rear, are replaceable without disturbine brake drums or hubs.

Wheels are the best second growth hickory, I2 spokes to the wheel, and little with hard rubber elinder tires 36 by 2.5 inches. The steering gear is of the worm and gear type, located at the left. The high gear control lever is in the centre. The low and reverse, as well as the brakes, are controlled by pedal. The wheelbase is 117 inches.

The experience of the members of the company in wagon business is of particular value in considering the body equipment, to which the Sullivan Motor Car Company has devoted special study for the purpose of giving the purchaser opportunity to secure the atmost efficiency from his car.

THE A B C OF MOTOR TRUCK IGNITION.

Part II—Outlining the Various Systems Utilized with the Commercial Gasoline Vehicle,
Their Components and Application in Practise—Defining the Construction and
Operation of Instruments Employed to Determine Conditions of Batteries.

By C. P. Shattuck.

O PERATORS of commercial vehicles propelled by the internal combustion motor should have some knowledge of electrical indicating instruments. They should know how to employ the voltmeter and ammeter, as well as the combined instrument, the voltmenter. They are made of the D'Arsonval and moving-iron types and in the following forms: Portable, approaching in accuracy the standard laboratory instruments, but designed to be carried about and brought to the testing bench or work; dashboard, for permanent mounting on the car, and pocket instruments. The last named are small sized, some being similar in appearance to a watch, and this type is generally employed for measuring the electromotive force, EMF, of dry cells and storage latteries utilized.

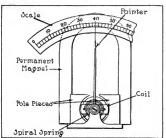


Fig. 5—likestrating the Components of the D'Arsonval Instrument, a Current Measuring Device.

in the ignition system of the motor car, to operate electric signalling horns and to light the lamps.

Types of Instruments.

Those employed with the motor car are of two types of construction, one having a moving coil, represented by the D'Arsonval instrument, and the other equipped with a moving armature. In any design the indications are denoted by a pointer or hand, which is caused to move over a calibrated dial in accordance with the variation in electromotive force, or current strength, as the case may be, by the effect of the varying current on a magnetic field contained within the instrument. The indicating hand is securely attached to a pivoted member, termed the moving element, which the varying magnetism causes to turn or deflect against the tension of the spring.

The D'Arsonval instrument, named after its French inventor, is shown at Fig. 5, and consists of a permanent horseshoe magnet having two pole pieces located between its ends and so shaped as to be brought in proximity to each other to develop a powerful magnetic field between them. In this field is mounted a light, pivoted coil of insulated wire, to which is secured the indicating hand which projects out over the scale or dial. The eoil is composed of very fine wire and carries a very small current, but the latter is proportional to the EMF, or current strength, passing through the instrument. In the commercial form of instrument a pair of light, spiral hair springs of resilient non-magnetic metal are employed to oppose the movement of the coil by a force directly proportional to the current passing through the coil, so that the pointer stands normally at zero on the dial when the instrument is not connected to a live circuit. When attached to a battery, etc., the indicator will denote the strength of the current.

The springs also serve to lead the current in and out of the coil. The movement of the coil against these members is caused by the reaction between the strong field of the permanent magnet and that due to the weak current passing through the coil, in accordance with the principle of magneto-electric induction, which causes a wire placed in a magnetic field and carrying a current to tend to move at right angles to the direction of the field.

Uniform Reading Scale.

A uniform reading seale in the D'Arsonval instrument is obtained by equalizing the retractile force of the springs, and by providing a uniform field. The former is secured by winding the springs, which are placed one above and the other below the moving coil, in right and left hand spirals. When the coil is deflected it expands one spring and at the same time contracts the other. The uniform field is obtained by proper strength of the permanent magnet, proportioning the soft iron pole pieces, and dimensions of the air gap.

The difference between the construction and operation of a voltmeter and ammeter designed on this principle is shown in the application of these members to measure the strength of an ignition battery and that of a current flowing in the primary cool circuit, these being depicted at Figs. 6 and 7 respectively. In the former the circuit goes from one binding post or connection to the other through the moving coil and a fixed resistance coil in series, the total resistance of the in-strument being high.

The instrument may be connected across the terminals of a battery or generator without danger of injury to it, provided, however, the EMF of the battery,

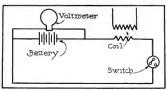


Fig. 6—Showing the Wiring Plan of a Voltmeter Employed to Ascertain Voltage of Hattery or Current Generator.

for instance, is not greater than that of the instrument. Since the current which passes through the instrument is strictly proportional to the EMF of the battery or other source of electricity, the instrument is calibrated in volts.

Wiring for Ammeter.

The ammeter, shown at Fig. 7, is connected in the circuit, and the entire current passes through it. In the instrument itself practically all of the electricity goes from one terminal to the other through a bar of resistance metal, in which occurs a small but definite fall of potential equal to the product of the current and the resistance of the bar, in accordance with Ohm's law. The moving coil is secured to the ends of the bar, which is called the shunt, because it shunts or diverts from the moving coil most of the current passing through the instrument, which is calibrated in amperes.

Portable ammeters and voltmeters are sometimes constructed with two and three scales on the same scale are, the number corresponding to the additional windings in the instrument and terminating in extra binding posts. A two-scale voltmeter employed for both electric and gasoline cars may have one scale reading from zero to 15 volts. The former is utilized in measuring the EMF in charging the battery of an electric vehicle while the latter gives greater accuracy of readings when testing single cells or ignition batteries, Dashboard instruments of the D'Arsonval type are constructed on the two-in-one plan; that is, a volt-meter and ammeter are mounted side by side in the same case.

Dead-Beat Action.

Instruments constructed upon the D'Arsonval principle are made dead-beat by the use of the phenomenon of the so-called eddy, or Faucault, currents. A deadbeat pointer is one that comes promptly to rest at the proper point on the scale, when the circuit to the instrument is closed, without moving back and forth,

The moving coil is wound upon a light frame of high conductivity metal and encloses a soft iron cylinder, secured to the instrument base co-axially with the coil and permanent magnet pole pieces, in such manner that a strong magnetic field is developed with only a small air gap, the latter comprising the clearance in which the coil frames may move.

Eddy currents are developed in a conductor when it is moved in a magnetic field, and the generation of these currents absorbs power, which tends to check the movement of the conductor. In this manner the metal frame in the field is quickly checked in its movement when the instrument is connected up to a live circuit, and the pointer stops quickly when it reaches its proper place, very much as if it had experienced mechanical resistance.

Pocket or Small Instruments.

Voltneters and ammeters, as well as the combination instruments employed for testing dry cells and storage batteries utilized in the ignition system of the automobile, are calibrated to give readings of from zero to eight or 10 volts and from zero to 30 in amperes. There is also another type of ammeter having fine divisions for reading the current utilized by a coil, the operation of which will be explained in logical sequence.

In voltmeters and ammeters of the so-called pocket or watch type, the moving element to which the indicating hand is secured consists of a simple armature or vane of soft iron. This armature is supported on pivot bearings in a magnetic field. In one class of these instruments a fixed voltmeter or ammeter coil, having a fine or coarse wire winding, is mounted so as to set up a magnetic field at right angles to the permanent magnetic field, and the armature is caused to deflect by the variation in the strength of the coil's field, this being brought about by variation in the EMF or current strength in the circuit to which the instrument is connected.

A pocket ammeter complete, and with cover, dial and pointer removed, is shown at Fig. 8, A and B, respectively. It will be noted that a soft iron vane is provided to which the pointer is attached and which swings on pivots in the U shaped brass strip. The pointer is normally held in the zero position by the field of the horseshoe magnet. The ammeter coil comprises a number of turns of coarse wire wound over a straight core of soft iron at right angles to the main

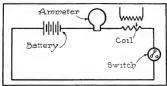


Fig. 7-Wiring Plan of Ammeter Connected in the Circuit Series.

field. The magnetic flux due to the current passing through the coil distorts the main field, causing the vane and its attached pointer to take up a new position deflected from zero and through an arc approximately proportional to the strength of the current.

In some makes of small instruments quick reading ability is sought by making the moving element as small and light as possible, while in others, an air vane is employed with the moving element to check the movement of the indicating hand. The binding posts or terminals are made pointed and cup shaped, to facilitate making contact with the terminals of the battery by simply touching one instrument binding post on one battery member and using a short flexible cord connection from the other terminal of the measuring device to the other post of the battery.

Combined Instruments.

In the combined instruments, which make it possible to read volts and amperes separately, the flexible cord is secured to the top of the instrument and with some is of the removable type. The lower portion of

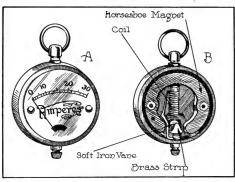


Fig. 8—Conventional Type of Pocket Ammeter: A, the Calibrated Scale and Indicating card them, and when one cell

the case or housing is fitted with two terminals and these are marked A and V, denoting volts and amperes, respectively, as illustrated by the instrument shown at Fig. 9 B and C.

When it is desired to ascertain the condition of a dry cell, and an ammeter is employed, the lower terminal is placed in contact with the positive or carbon element and the cord terminal touched to the negative or zinc terminal. In reading single cells, which is the proper method when testing a number of ignition numbers wired together for ignition purposes, the ammeter may be employed as depicted at Fig. 9 A. Here the lower post is in contact with the positive or carbon clement and the metal case of the instrument is touching the zinc post. As shown in the sketch the pointer registers about 17 amperes, denoting that the cell is in good condition.

The combined instrument is favored by many as by it both dry cells and storage batteries may be tested. At C is outlined the method of employing the member when reading of a dry cell is desired. The post of the instrument marked A is held in contact with the carbon element of the battery while the metal end of the flexible cord is touched to the zinc post. In testing dry cells readings for amperage are usually taken, although volts may be read if desired.

At B is shown the combined instrument being employed for reading the voltage of a storage battery. The connections are made in the same manner as with the dry cell with the exception that the V post of the instrument is employed. It will be noted that the instrument is provided with a double scale, the upper figures indicating amperes while the lower shows the volts. In the illustration the pointer is resting at six, denoting that the battery is in good condition and

ready for service. The ammeter should be used only to test individual dry cells and it denotes the condition of the cell at the moment the reading is taken. It does not demonstrate that one cell will last longer than another under the same condition of service although both members may give exactly the same reading in amperes. High amperage is not always an indication that the cell will give long service, for the reasons given in the previous installment. Personally the writer favors a dry cell of standard design, which has an initial amperage of from 15 to 22, than one whose amperage is considerably higher, When dry cells register less than seven or eight amperes, it is best to disshows this amperage in a set of

others registering approximately maximum amperage, it should be set aside, as it will affect the efficiency of the group. It is advisable to have cells of a set as nearly uniform as possible.

Dry cells should never be short circuited. A short circuit is formed by placing some piece of metal with no great amount of resistance in it across the terminals; that is, the positive and negative poles. This causes a large amount of current to flow through the conductor and to generate hydrogen faster than the manganese can take it up, with the result that polarization follows.

Care of Cells.

Dry cells should not be placed where they are subjected cither to heat or a considerable vibration, as the former dries out the moisture in the electrolyte, while vibration tends to loosen the filling compound and carbon, affecting the contacts and decreasing the efficiency of the cell. In connecting a number of cells care should be taken to see that the proper poles are wired together, as an error may result in a short circuit in several members. In installing cells they should be so placed that the zinc shells or terminals do not come in contact with one another, or with any piece of metal, such as the battery box. Careless installation of cells, especially placing them loosely in the battery box, etc., is responsible for inefficiency as well as broken terminals. When properly wired and installed dry cells give good service and require no attention other than testing.

Testing Storage Batteries.

The voltmeter is employed for testing storage batteries and the ammeter should never be utilized for this work even on a single cell as the current is too strong for it and the instrument is liable to be ruined. Unlike the dry cell the condition of a storage battery is best ascertained by the use of the voltmeter. A charged cell on an open circuit may read 2.2 volts and on a closed circuit it should read two volts. With a

HORSES IN KANSAS.

Mechanical Transports and Agricultural Implements Rapidly Replacing Older Methods on the Farm.

Word comes from Kansas that the faithful horse has been displaced rapidly the past few years by the automobile and traction engine. In one year Kansas lost 18,582 horses and in four years 67,000. In the same period the state has gained 16,000 motor cars and 1700 traction engines for farm work. The big loss in the number of horses is principally in the wheat country in central and western Kansas, where the farms range from 300 acres up.

Most of the motor cars bought in Kansas go to the farms. Out of 18.625 machines listed, 10.784 are owned by the rural inhabitants of the state. Around Topeka there are 70 farm trucks in constant operation. In western Kansas big farms which formerly maintained 40 to 50 horses, now have scarcely half a dozen. The work is done by traction engines and a few horses

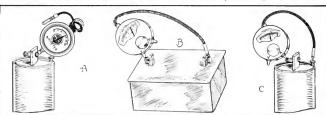


Fig. 8—Showing How Voltmeters and Ammeters Are Employed: A. Reading Dry Cell with Ammeter; B. Ascertaining tion of Storage Battery with Voltmeter; C. Showing Utilization of Combined Instrument with Dry Cell.

three-cell battery, which is generally used in ignition work, the total voltage should be about six. Storage batteries should not be employed in service when readings show a cell below 1.7 volts.

The battery should never be short circuited. Some drivers have a habit of attempting to test it by placing a pair of pliers or a screw driver across the terminals and enessing at the condition of the battery by the sparks given off. This is poor practise as it causes a sudden rush of current of such strength that it would exhaust the capacity of the cells in a very short time. It also causes a sudden rise in temperature and expansion of the plates. The charging and care of storage batteries will be taken up in logical sequence.

(To Be Continued.)

Ed. Note-The next installment will deal with conductors, explaining the utilization of primary and secondary wires, also outlining the transforming of a lowtension current into high by means of an induction coil, The function of the timer and distributor employed with the battery and coil system will also be explained.

perform the light work which would be unprofitable for big engines to do. Two men can handle the gasoline tractor and look after the plows while the engine turns over 30 acres of ground a day at an actual expense of 40 cents an acre. The average cost of ploughing with horses is 75 cents an acre, so that the big saving comes in the number of men needed to handle the plows.

Four Gramm Models-Four standard models with carrying capacities of one, two, three and five tons, constitute the line of Gramm trucks being constructed by the Gramm Motor Truck Company, Lima, O. As long overhangs are considered undesirable in truck construction, this fact was taken into consideration in designing the Gramm, the models of which follow the same lines in general, the chief difference between the types being in dimensions. The two, three and fiveton trucks have the distinctive Gramm features which include a four-cylinder, vertical, water-cooled motor, high-tension magneto, etc.

FOREIGN TRUCK NOTES OF INTEREST

BRITISH ARMY SUBSIDIES.

Something Concerning Conditions Governing Grant to Vehicles Suitable for War Purposes.

In view of the part played by motor trucks in the recent military maneutres in this country it will prove of interest to consider the conditions adopted by the British army, governing the subsidies to be paid owners of trucks enrolled for purchase in the event of war. And in this connection it will be noted that these follow somewhat closely the unofficial recommendations made as a result of the tests conducted in America.

For instance, the carrying capacity must be of two classes—a useful load of three tons and of 1.5 tons.



Lacre Special Colonial Type Two-Ton Truck Produced for Export to the Argentine Re-

The weight of the body is not included under the head of useful load. The larger car has weight allowance as follows: Useful load, three tons; three men on driver's seat, 600 pounds; kit. including spare gasoline tins, 200 pounds; peaviest body to be nsed, 1900 pounds; cab, 300 pounds; For the lighter vehicles the items are: Useful load, 3000 pounds; three men on driver's seat, 600; kit, etc., 200 pounds; the aviest body to be used, including cab, 1700 pounds. This gives the total weight of chassis as 8100 pounds for the larger ar and 5500 for the smaller, with a gross weight not exceeding 14,100 and 10,000 pounds for spectively.

It is pointed out that the main object of the conditions is to make the manipulation and control of all vehicles the same, and to minimize the number of

spare parts which must be carried in the field, having regard to the number of different makes of vehicles of which the transport columns of the army would be composed. The engines in both classes must be of the vertical four-cylinder type, utilizing gasoline up to 760 specific gravity. The minimum cylinder bore must be 4.5 inches for the larger class and four for the smaller.

Cylinders must be cast in pairs, all inlet and exhaust valves to be mechanically operated. Valve stems are to be enclosed by dust tight covers, which must be so designed that they are readily removable, and so that the accessibility of the valves and cylinder holts is not affected. Inspection doors of ample size must be provided in accessible positions at the sides of

the crankcase, so as to make the big end bearings thoroughly accessible for examination,

Engines must be under a bonnet, which is entirely removable. Vehicle with motors under the driver's seat will not be accepted. All connections for throttle, governor, ignition, etc., must be by means of rois, not wire. All engines must be provided with governors, which are to be set so as to prevent the motor speed from exceeding 1000 revolutions a minute.

Ignition must be high-tension magneto. In order to ension magneto. In order to enable the timing of the ignition to be set readily, the flywheel is to be clearly marked to a fixed pointer with stamped directions. Leads to the differrections.

ent cylinders should be of different colors. All lubrication must be by positively driven pump.

Both classes of vehicles are to be fitted with transmissions affording four speeds forward and reverse. The final transmission of power to the rear wheels is to be by means of a live axle in which a bevel drive of approved design should be employed. Chain drive to hind axle will not be permitted.

Several other features are specified, the list totalling 51 items. Vehicles accepted for enrollment will receive a subsidy of £110, payable in six semi-annual installments, in arrears. The trucks are not permitted to leave the country without special permission of the war office, and must be inspected at stated intervals to determine that they are properly maintained.

LACRES IN SOUTH AMERICA.

English Concern Takes Advantage of Splendid Opening Afforded in Argentine Republic.

The Argentine republic promises to offer a good market for commercial vehicles in the near future, and this holds true particularly in the vicinity of Buenos Ayres, where considerable good roads construction has been under way during the past year. Foreign countries have taken advantage of the opportunity afforded and among the manufacturers who have placed cars of this type is the Lacre Motor Car Company, Ltd., Letchworth, England.

An accompanying illustration shows one of the four-ton Lacre special colonial type trucks recently delivered in Buenos Avres. It has a four-cylinder, water-cooled motor, rated at 38 horsepower and equipped with a governor limiting the speed of the engine to 1000 revolutions a minute. Ignition is by high-tension

magneto, with provision for easy removal of the plugs. Another feature is the possibility of fitting a duplicate high-tension magneto and separate set of plugs.

The clutch is a cone member faced with leather and of large dimensions. Power from the engine to the four-speed transmission is through a special form of spring drive, which is claimed to take up all road shocks. Final drive is by roller chains. Two independent donble-acting brakes are fitted. both being supplied with cast iron shoes which can be renewed readily.

ence between this model and

and the standard product sold in Great Britain is to be found in the matter of ground clearance and in the use of a special arrangement for cooling. It is maintained that this idea of providing against excessive heat is still further carried out in the construction of the body and top. The vehicle is similar in every respect to those which have seen considerable service in Australia, and for which a number of repeat orders have been filled during the past year.

COMPETING WITH RAILROADS.

British Firm Presents Attractive Proposition for Delivering Goods by Time Table.

Until very recently the people of Great Britain were not greatly impressed with the possibilities for utilizing motor trucks in competing with railroads. Several business men had never considered the propo-

sition until a strike compelled them to adopt such means temporarily. It is somewhat surprising, therefore, to find that a London firm, The Inter-Transport Company, has been organized for the purpose of operating a delivery system, under a specified schedule, from London, Manchester, Glasgow, Birmingham, Dublin, and other cities.

The plan was put into execution in July and hardly can be said to have demonstrated its thorough practieability as yet. However, the officials claim they will be compelled to increase their equipment materially this month, and expect to more than double it by the end of the year. The scheme is even broader than anything that has been attempted in America to date.

Eight five-ton Berna trucks and trailers are being operated in London, which is the only city in which the plan has been tried as yet. Each combination is capable of hauling 10 tons, and it is anticipated that they will be able to maintain a specified schedule, arriving and departing from certain stations according



Practically the only differ- Camion Travelling Workshop Recently Purchased by the French Government for Army Field Work.

to time table. The development of its plan will be watched with interest, both in this country and abroad.

TRAVELLING MACHINE SHOP.

French Army Acquires Novel Equipment for Making Repairs While in the Field.

An accompanying illustration presents the new Camion travelling workshop, which was purchased recently by the French government, for use by the army while in the field. As outlined, the equipment is adapted particularly for use by the aviation corps, although its nature is such that it may be utilized onite as advantageously in connection with the motor vehicles in the army, or for other repair work which may appear

The illustration shows the vehicle ready to take the

field. When a stop is made, both sides are let down upon specially constructed standards. The interior equipment includes a lathe, grindstone, carpenter's shop, vises, etc., all operated by electric energy, supplied by the vehicle motor. It is maintained that with this machine it is possible to undertake all manner of repairs.

NEW ENGLISH CONCERN.

Amalgamation of Two Well Known Companies Will Result in Production of Extensive Line.

British Business Motors, Ltd., Coventry, Eng., is a new commercial vehicle manufacturing concern which promises to make itself felt in its particular field. The company has acquired the motor manufacturing business previously carried on at Coventry as the Sturmey Motors, Ltd., together with the latter's Lotis works, and also the adjoining plant recently owned by the Hewer Car Bodies, Ltd. In addition to these properties there are several acres of land adjacent thereto.

F. G. Burford is the managing director with a considerable share in the stock of the concern and associated with him as co-directors are S. F. Edge and H. T. Vane, general manager of S. F. Edge, Ltd. The output of the company will include models from one to five tons capacity, to be known as the Cunard business motors. New shops to cover the unoccupied land are being constructed rapidly. Mr. Burford brings to the firm a unique experience. He is a pioneer of the commercial vehicle industry in Great Britain, having introduced those vehicles to the Great Western Railway. London & Northwestern Railway, Great North of Scotland Railway, Great Eastern Railway, Lancashire & Yorkshire Railway and practically all the leading London omnibus companies

TWO FOREIGN OPPORTUNITIES.

American Consulates Can Place Agencies with Dealers in Europe and the Far East.

According to bulletin 9270 issued by the government bureau of foreign and domestic commerce, Washington, D. C., a leading dealer in automobiles and accessories in a European city informs an American consulate that he desires to receive from American manufacturers of trucks immediate offers of machines of two and three tons capacity. Prices in excess of \$2500 cannot be considered or offers which do not carry with them exclusive agency rights for the country. Correspondence is invited, in English, and catalogues and drawings should be accompanied by all necessary technical information.

A business man in the Far East informs an American consulate that he desires to secure illustrated catalogues with price lists and discounts, gross and net shipping weights, capacity and horsepower of motor trucks for hauling goods from railway stations and steamboat landings to various parts of a certain city. The trucks must be of heavy construction and the wheels fitted with non-skidding solid tires, as the streets and roads are very rough. In whiter they are frozen and in summer the mud is deep in places. Extra copies of catalogues should be sent to the consulate for filing. Inquiries may be made to the bureau of foreign and domestic commerce, mentioning bulletin No. 9520.

MORE POSTAL AUTOMOBILES.

London Authorities Add Seventy Machines After Successful Test of Those Already in Service.

The London postal authorities have ordered 70 new more mail wagons to convey letters and parcels between the central and district offices and railway stations. The vehicles will carry one ton each and will increase the motor fleet of the London general postoffice to about 100 machines.

The postal officials believe that this aggregation of motor vehicles will prove of great value and would be of considerable advantage in the event of a continued railway strike, as many of the wagons could be used for the collection and distribution of letters and parcels in places even at a considerable distance from London.

GENERAL NEWS FROM ABROAD.

Fire Exhibit in Ontario—In connection with the recent fourth annual convention of the Provincial Association of Fire Chiefs for the Province of Ontario, at Woodstock, Ont., it was arranged to have an exhibition of tools and equipment used in modern fire extinguishing practise. No charge was made for space and special time from the convention business was allotted for the demonstration of exhibits. Interest in motor driven apparatus was keen and the exhibition may result in its adoption in several Canadian cities and towns.

Motor 'Buses in India—The motor 'bus has penetrated into India and judging by reports of big dividends which the pioneer company is earning, it has appeared to stay. Regular service is now being maintained between Butterworth and Permatang-Bendahari, and between Bukit Mertajahm and Kulim. in Wellesley province, Penang, in the western part of the Malay peninsula.

British Museum Buys Horse Vehicles—The British museum, that vast repository of the ancient and curious, is taking time by the forelock and has purchased a horse drawn hansom cab. This is to be preserved with other ancient vehicles of which the museum has a large collection. The purchase was made in order to preserve at least one of a type of whicle which is now growing extinct because of the advent

of the automobile. Beside the cab, arrangements have been made to purchase two other horse vehicles. This action by the British nuseum affords small comfort to those who maintain that the horse is holding his own.

Fire Apparatus in Russia—There is a splendid opening in Russia for the supply of motor fire apparatus. This vast empire is only just awakening to the necessity of adequate municipal service of all kinds in other than the few principal cities. A majority of the buildings are of wood and as yet there is only one piece of motor fire fighting apparatus in entire northern Russia. This is located at St. Petersburg and was purchased under protest, with a view of selling it after its delivery. However, it has given such a good account of itself that the advisability of purchasing more when the necessary appropriation can be passed is under consideration.

Edinburgh Wants Motor Engines—Firemaster Pordage of Edinburgh, Scotland, has furnished particulars of the need of his brigade's requirements in motor apparatus, which include three gasoline motor fire engines with plunger type pumps and two 50 horsepower gasoline motor chassis for use as fire tenders,

American Trucks in Guatemala—The government of the Guatemalan republic recently purchased four American automobiles for its army. The cars were each equipped with a field piece and two of them were also fitted with wireless apparatus.

Taxicabs in War Manoeuvrea—During the early fall there were 500 fewer taxicabs in use in London than under ordinary circumstances. The war office commissioned the vehicles for use during the autumn army manoeuvres. The cabs were transformed into transport wagous. The searcity of cavalry horses in the British army made the innovation necessary and demonstrated the impromptu efficiency of the motor vehicle in case of emergency.

Want Motor Driven Plows—An importer and commission agent in a European country informs an American consulate that several of his clients desire prices and specifications of motor driven plows. He adds that large numbers can be sold in his country, which is largely agricultural. What is desired is a light motor plow with two or three shares. The consulate would be glad to receive additional catalogues and price lists of all kinds of machinery, especially agricultural, as there is constant demand for them. Particultural as there is constant demand for them. Particultural and domestic commerce, referring to bulletin No. 9510.

Police Vehicles in Canada—The police commissioners of Toronto, Can., are strongly urging the purchase of motor driven apparatus for the police department, in which there are none at present. The fire department has been equipped with a few motor vehicles and the innovation has been a decided success. It is thought probable that next year the police department will be equipped with at least two motor ambulances and two motor patrol wagons. The detective department may also secure a fast motor car for special work.

Duty Removed from Motor Vehicles—For a period of six months, dating from Aug. 1, motor vehicles, other than private cars, will be imported free of import duty into San Salvador.

Possibilities in Mexico—No automobiles are made in Mexico, every machine used in that country being imported. The City of Mexico is the distributing centre for the principal mining districts. All the streets are asphalted and most of the streets leading out of the city are macadamized.

Italy Orders 100 Motor Trucks.—The Italian war department has ordered another hundred motor trucks. It is uncertain whether or not these are intended for use in Tripoli. They will be equipped with Michelin tires. Earlier in the year Italy sent to Tripoli a large train of Michelin equipped motor vehicles, which were used successfully for transport of provisions and ammunition.

Transport Service in Assam—The government of Assam has recently inaugurated a service of motor transport vehicles for goods and passengers between Gauhati and Shillong.

Motors Available for German Army—Under the German subsidies system it appears that there is now a total of 70,000 motor vehicles available for army service, including 20,500 motorcycles, 23,000 private cars, 20,000 tradesumen's vans and 7100 omnibuses and motor trucks. This is an increase over the previous year of 7.84 per cent, chiefly in tradesumen's vans.

Trucks Supplanting Nigerian Natives—Finding that in the dry season one motor truck can do the work of many hundreds of natives, the shareholders of the Rayfield (Nigeria) Tin Fields, Ltd., have authorized the company to send out four motor wagous to transport its product to the seaboard. In the past the company employed thousands of natives carrying head-loads, and later at Rahamma, the terminus of the Bauchi railway. 1200 donkeys were put in service. It is probable that in the near future all the work of transportation, at least during the dry season, will be done by motor trucks.

Russian Trials Attract French—A number of French manufacturers have entered cars for the Russian war office trials and these machines are now performing their work, which will continue until the end of the month. The French machines taking part are: Saurer, De Dion-Bouton, La Buire, Renault. Delahaye, Latil. Bayard-Clement, Berliet and Schueider. The Russian requirements are vehicles having a load capacity of 1.5 and three tons. It is understood that the vehicles that satisfy the army conditions will be purchased outright and that the route to be followed will be St. Petersburg, Novgorod, Krestzy, Moscow, Cladimir and return to St. Petersburg.

*ARTA を 企業に関いる。



CONTROL OF THE PROPERTY OF THE

BASSESSAN AND STATE OF THE PARTY OF THE PART

E. E. Guston, formerly with the Studebaker Corporation, has accented a position with the Velle Chicago Branch.

The Service Motor Track Campany, Camden, N. J., has been incorporated for \$50,000 by R. L. Smith, C. D. Hackett and E. J. Eldridge.

The Ex-Col Motor Truck Company has been incorporated in Jamesburg, N. J., for \$50,000 by T. C. Corwin, A. Englehart and A. K. Kelley.

M. R. Paige, formerly sales manager of the Moline Wagon Company, Moline, III., has joined the sales force of the Velle Boston Branch.

Thoraton Newsum of Memphis, Tenn., has opened a branch office and salesmoon for the product of the United States Tire Company, New York City.

The Cole Mater Une Company of Georgia, Atlanta, Go., has taken the agency for Federal trucks, made by the Federal Motor Truck Company, Detroit.

The A. W. Itall Animobile Company has been organized in Operating to handle the Hatfield truck, made by the Hatfield Company, Eintra, N. Y.

W. H. Atkinson of the Windermere garage, Cleveland, O., has taken the agency for the Sanford truck, made by the Sanford-Herbert Company, Syracuse, N. Y.

The Mustison Mutor 'Rus Company has been incorporated in Madison, Wise, with capital of \$5000. The Incorporators include Fred W. Cosmibe, Paul Kiney and Harry J. Parker.

Fife & Mitter, Dallas, Tex., has closed a contract with the Lincoln Motor Car Works, Chicago, maker of the Lincoln light delivery wagons, for the agency in central Texas.

E. C. Kadow & Co., Chicago, 11L, has been incorporated for \$25,000 to manufacture commercial vehicles. The incorporators include Benjamin Gordon, Simon LaGrow and others.

The Rittenhouse-Winterson Auto Company, Baltimore, Md., has taken the agency for the Seltz gearless truck, made by the Seltz Automobille & Transmission Company, Wyandotte, Mich.

Haffer & Uand-Unur, Phoenix, Ariz, has taken the state agency for the Moreland distillate truck, made by the Moreland Motor Truck Company, Los Angeles, Cal.

The Reliance Track & Garage Company, 111-115 East Lyan street, Columbus, G., is building a large addition to its garage to meet the increasing demands for a commercial vehicle service station.

The H. Siegel Company, 1b-troll, finds that the five Cartercar delivery wagons, made by the Cartercar Company, Ponthac, Mich, and shown in an accompanying illustration, do the work of 15 horse wagons, and that it could not afford to go back to the old system of doing business even if it cost more to oper-

ate the trucks, which it does not. Mr. Slegel says he cannot see how any up-to-date firm can continue to use the old horse delivery warons.

James B. Farber has opened a new office at 260 Haisey Street, Newark, N. J., as manager for the Newark agency for L. H. C. wagens, made by the International Harvester Company, Chicura.

The Commercial Auto Company of Lexington, Ky., has taken out articles of Incorporation with capital stock of \$1500. The following are interested; J. N. Gibbons, W. R. Williams and H. N. Williams.

The Highland Body Company, Cincinnuti. O., is issuing an attractive booklet setting forth the merits of the motor truck bodies produced by it. Those interested may secure a copy by addressing the company.

The Newark Auto Truck Manafacturing Campany, Newark, N. J., has been incorporated for \$500,000 for the manufacture of commercial motor vehicles. The incorporators are O. W. Babhage, H. H. Poole and J. T. Walsh.

G. A. C. Haiff, San Antonio, Tex., has organized the Halff Company, with headquarters in Dallax, and will represent the Federal truck, made by the Federal Motor Truck Company, Detroit, Mich., in that territory.

The Nyberg Antomobile Works, Anderson, ind., maker of Nyberg pleasure and commercial cars, announces the appointment of the following agents: Hunter & Co., Steubenville, O.; L. F. Carr, Jacksonville, Fla., and Jack Williams, Buxton, In.

The R. A. Hall Motor Truck Company, Boston, Mass., has taken the agency for the Available truck, made by the Available Truck Company. Chicago, and has opened a new service station to take care of its patrons.

The Lincoln Mater Car Works, Chicago, III. maker of Lincoln trucks, has seenred the Rockwell Motor Transportation Company, 621 West 12nd street, New York Phys. as its representative in the metropolitan district.

The Adams Bros. Company. Findiay, O., has appointed the following additional agents for the Adams trucks, made by it: Roscoe Benjamin, Winsted, Conn., and Magna Auto Company, Britiston and Raifrond streets, Holyoke, Mass.

L. W. Willams, for some time connected with the advertising department of the Locomobile Company of America, Bridgeport, Conn., maker of Locomobile trucks and fire apparatus, has entered the truck sales department of that company.

Joseph H. Alfred, chief clerk in the commercial department of the Michigan State Telephone Company, Detroit, has resigned to take a position with the Detroit branch of the Goodyear Tire & Rubber Company, Akron, O., maker of Goodyear tires.

The Suspension Roller Braring Company, Sandusky, O., is to erect a factory east of the plant of the Sandasky Auto Parts &



Five Carterear Delivery Wagons in Service with the B. Siegel Company, a Well Known Detroit Department Stare,

Motor Truck Company on First street, to rost approximately \$30,000.

The Hatfield Auto Trock Company was recently incorporated in Eliutra, N. Y., with a capital stock of \$1,500,000 to manufacture motor trucks. The incorporators are bavid if McConnell, A. D. Henderson, A. S. Hoyt, all of New York City, and others

The Taxt Service & Haggange Corporation of Wilmington, bed, has been incorporated under the laws of belaware with a bed, that the laws of the laws or with a capital stock of \$150,000. The incorporators are W. J. C. Pulany, Battimore, Md. W. L. Lamberdin and A. P. Tkom, Jr., of Norfolk Va.

The Shaffer Anto Supply Company, 1249 Broadway, Denver, Col., is the name of a new consern which will handle standard accessories and supplies for pleasure and commercial mater vehicles. The agency for the Blatt truck has been taken for Colorado.

The Genge Cower Vehicle Company, St. Paul, Minn, has been succeeded as agent for the Grahowsky Truck, made by the Grahowsky Fower Wagon Company, Jetroit, by the Motor Truck Company of that city. S. L. Buchanan and T. D. Lovering are the proprietors.

Hush, & Holland recently took over the business of E. Il. Bush, Springfield, O. The new convern will continue to carry on the wagon and carriage repair husiness located on South Fountain avenue, and will also conduct an agency for the Detroit motor waxon.

E. Q. Cordurz, who has been sales manager of the American-Marion Sales Company in New York City, has resigned to become manager of agencies for the R. & L. Company of that city, The United States Company has been organized in Philadelphila to the cover the ascent for those tracks, made by the Philadelph

The Federal Mater Truck Company, betroil, maker of Federal trucks, automores the appointment of the following additional asciectos. Rekentoth Sales Company, Cheveland, (); Instructed to K. Sungh! Company, Slow (Ut, Ia.; L. U. Hayden, Tecumech, Mich., and American Truck & Auto Company, Methourne, Australia.

The Railroni Motor Car Company, Marion, Iod., was recently formed with a capitalization of \$200,000. The purpose of the company will be to manufacture and to repair motor vehicles 19, and John 19. Worth, Hiram Beshore, George R. Stewart and Eben 11. Walcott.

George A. Crame has been secured by the Locomobile Company of America of Bridseport, Com., to take charge of its truck business in the territory controlled by the Chicago franch. Before joining the Locomobile forces, Mr. Crame was connected with the Knox Automobile Company and the United States Motor Company.

The Otis Motor Unr Campan; has been incorporated in South



Sixty Federal Trucks, Made by the Frderal Motor Truck Company, Detroit, Which Took Part in Recrut Cadittiqua Parade in That City,

general costern representative of Garford trucks, made by the Garford Company, Elyria, O.

The R. A. L. Company, Brooklyn, N. Y., eastern agent for the Garford line of trucks, control of the manufacture of which was recently secured by President John S. Willys of the Willys-Overland Company, has decided to open a new branch at Bedford avenue and Fylling sirect.

The Nervice Recorder Company, 2344 East 1d5th street, Cleveland, O. amounces that the Aleo truck which is engaged in kauling a lead of merchandles across the continent, is utilisting one of its Servis recorders, in order to have accurate data concerning the running time on route.

The Todd & Courtney Company has been formed in Harberton, et., with a capital stack of \$10,000 to manufacture automodifies wasons and other vehicles, and accessories. The mobers of the concern are John H. Todd, Cura A. Todd, I. O. Courtney, Japus & Courtney and C. C. Pourtney.

The Uttahung Motor Service Corporation, Pilitsburg, Penn, has perfected plans for a new frequent motor truck depot to be effected at Piest avenue and West street. The building will be the storyes in height and contain all modern appliances for the storage and undirenance of connocreal vehicles.

The Indian Garage A Note Company has become the distribution succeed in Kannar 1913, Ma. and vicinity for the Lindwick Company of the Lindwick Chicago. Headquarters have been opened at 2316 East Lish street, Kannar City. The Jo-AR Company, located at 2328 Kannar acture. Topicha, Kan, has dieed a contract with the Topick and Vicinity of the Company o

Bend, Ind., with a capital stock of \$10,000. The members of the firm are N. L. Otts, Gilbert Squires and J. B. Bentile. The coupany has a location at Main and Division streets, and has thaseincy for the K-Hy, Franklin and Phase trucks, and the Cadillac and Franklin ideasure care.

The Wesifield Motor Truck Sulra Lompus, is a new Hoston firm organized to handle the Westheld, manufactured at West-Beld, Mans. Moorne L. Puck, Identified with the trade for its years, is manager and E. A. Metirath is in charge of the well equipped service station, which contains apparatus for all sorts of our resorted.

The Varces (ampany was formed recently in Buffalo, N. Y., for the purpose of renderting a commercial vehicle salastroni and garage. The directors include (off A. Magelli, Thomas LaVere, Walter W. Miller W. H. Rodenhouse, James Fox, Farles Poster, Fred Baker, Frank H. (NYeill, James Moran, W. H. 3tentz and Henry G. Walters

Fred A. Crooks was recently appointed sales manager for the American Locomotive Company, New York City and Providence, R. L. in the New York branch. Mr. Crooks has been identified with the automobile industry for the years, being formerly associated with the Darracq Motor Company and the Paimer & Singer Manufacturing Company.

William E. Norza, Bridgeport, Count, proprietor of the Gencal Motors Service & Traic Compans, hos leaved the starge formerly occupied by the Miller Motor Fay Company. Wild the hustness of the General Motors Service & Track Company maintain a thoroughly up-to-date stargac with first class equipment for the care and repair of pleasure and commercial care The Westcott Motor Truck Company, Little Rock, Ark., has been organized by L. Kempner, Irving S. Hirsch, Harry M. Westcott and Asa Grade to engage in the transferring busi-

The Pederat Motor Truck Company, Dotrolt, maker of the Federal trucks, has placed the following agencies: Vancouver liste Motor Company, Vancouver list, B. C.; David Stahler, Portsmouth, O.; Allen Baker, St. Louis, Mo.; American Motor Truck Company, Melbourne, Australia.

4. W. Salyers, former manager of the Buick Motor Company's Indianapolia truck branch, has been elected treasurer of the reorganized Showalter Manufacturing Company, Indianapolis, maker of automobile bodies. New offices have been recured at 216 Hanson avenue, Indianapolis.

Norwood Bross, Inc., Baltimore, Md., has taken on the valveless Veerac light delivery wagon. The motor has five moving parts, no radiator, no water or oil pumps, no valves, or no compilication of parts. Models of this wores are in use by John Wananaker & Company, Singer Sewing Machine Company and

The Parkard Mater (as Company, Detroit, has received the resignation of A. B. Holly, Boston, as manager of the truck department of the firm. He have the factor of the factors branch of the Relly Motor Car Company, at New York and will have as his territory a good portion of New York state, New Jersey and Commented.

The Morgan Motor Truck Company, Worcester, Mass, is meeting with deserved success in the manufacture of the Morgan truck. An accompanying illustration shows the new factory buildings, and a reorganization of the official force, which



Factory of the Morgan Motor Truck Company, Worrester, Mass., Where Morgan Trucks

has just been completed, places the company in an enviable position for the coming season.

The J. W. Lessitt Company, San Francisco, expects a prosperous year as the result of a trip through the Northwest just completed by Capt. Andrews of the corra, who has spect a month in that territory in the intensit of the foreclassic and Kinsel trucks. Capt. Andrews reports a keen interest in the commercial vehicle line throughout.

The Balairt & Limberger Company, Boston, general eastern distributor for the Garford Company, Elyria, O., maker of darford Company, Elyria, O., maker of the formation of the Company of t

The Ideal Arts Campany, Pert Wither, Ind., manufacturer of Ideal motor tracks, and accupied its new factory fulfilling, which will facilitate a new hoped its mean factory fulfilling, which will facilitate a new hoped the factor that with the improvements completed the concern will have capacity for turning out one complete trucks a day.

A. B. Gredner, manner of the New York City branch of the General Muters Truck Company, has religion. It is solid that the factory is at present over-burdened with work, necessiating a cessation of orders, which would leave no outlet for several months for Mr. Cordner's selling energy. He is making arrangements to join a new concern to be formed in November.

The Federal Weter Truck Company has added to its staff of executives Garvin Denhy, who is prominent in business circles in Detroit and the East. He began his career in 1997 and his

success as a superior salesman led to his appointment as recretury and treasurer with general charge over the sales department of the Federal company.

The firstford Company, Elyria, O., maker of Carford trucks, which recently established a new sisteroum at Boton, was graffied during the first week of its existence to receive a report from Manager P. H. Chrysler that he had secured an order for three five-ton clariford trucks from the Auto Transportation Company at Lowell, Mass. for use Detween that city and Bos-

The Todd Munificturing Company has plane under say to open a factory in Minnesophis, Minns, for the purpose of making radiators, boods, fenders, drlp pans, tanks and other sheet metal specialities for automobiles. The parties representing time are Prank Todd, formerly superlatendent of the Long Mandorgan C, Woods, of Chicaco and Betrott, B. A. Wolfe and Morgan C, Woods.

The Klasel Motor for Company, Hartford, Who, be etecting a magnificent garage at 237 West Ninth street. St. Paul, Minn, in order to handle the increasing business of the company in that city. The Klasel company in Intends to guaranter truck service and will always have on hand service trucks to take the place of any that might meet with an accident. Pleasurement of the company o

The General Vehicle Company, maker of gasoline and electric trucks, has filed plans for a six-story factory building to be erected at Long Island City, L. L. The structure will be 75 by 327 feet and eventually two six-story wings are to be added.

The White Company, Cleveland, O., manufacturer of the White pleasure and commercial vehicles, has established a direct factory branch at Baltimore, Md., which has been equipped with a large showroom. In which all the

large showroom, in which all the White models are shown, from the small touring car to the "Six-Sixty," and all commercial ears in every size the White company makes. C. E. Trace is manager.

Saucer' Motor Track Accorp. Springfield, Mass., representative of the Adams Hros. Company, Findlay. On his placed Adams trucks with the following concerns: Whoe-Smith Hill Daily Parm, Norfolk, Cons.: Ferguson Steam Laundry company. J. P. Plaherty and Casper Hunger, How Adv. Part De Louis, Cons. Herkitz, Edward Laundry, Laundry Company, Mariand Market, Marian Company, Sermideld, Mass.

L. E. Harmon, manager of the truck department of the Myers-Ahram Company, Roston, distributor to the Myers-Ahram Company, Roston, distributor to the Myers-Ahram Company, Fremont, O., has osened a finely equipped service station on the control of the most of the control of the most work three five, severe and the most work, three five, severe and the third of the most work, three five, severe and the third of the most work, three five, severe and the third of the market of the third of the market of th

The General Motors Truck Company, Postlar, Mich., has received another addition to its factors force, E. J. Ribourn, who reskned as minnager of the Kannas City branch of the Mitchell Lewis Motor Company. By this move he astain begins work under his old chief. William L. Iny, who in August re-spaced as sales manager of the Mitchell-Lewis company to become

The Ohlo Motor Company, Teledo, O., has been incorporated by E. J. Ansted, W. M. Shields and others to have the distributing agency for the Randolph trucks and Commerce delivery cars. A station has been opened.

The Indiana Garage & Sales (sumpan) has become the distribution again in Kanasa (Hg. Mo., and vicinity for the distribution light delivery waxon, made by the Lincoln Motor Carlotton (Lincoln Motor Carlotton) and the Carlotton (Lincoln Carlotton) whereby in becomes distribution acent for Incoln company, whereby in becomes distribution acent for the Carlotton (Lincoln Carlotton) and the Carlotton (Lincoln Carlo

The Klasel Motor (or Commons, Harlford, Wh. maker of the Klasel-Kir trocks, has almosted the following low active appointments. Charles F. Hamilton, Carbondale, Ill. L. M. Dann, Minrat Wells, Tex.; W. A. Hill, San Angel, Tex. Wesley, A. Hill, Phoenib, Arti, Miron R. Charleslik, Alerinetr. Wie, L. George Flinck, Syrmens, S. Y., Il. A. Fuller & Co., New Bochelle, N. Y.; Porcival & Slisby, R. Johnsbury, V., D. L. Statel, A. B. J. L. A. Fuller (Adarcs), Merchander, M. M. S. Statel, M. M. S. Statel, S. M. S. Statel, S. M. S. L. Baphille, Montreal, Com. H. H. Kerz, Calary, Merchander, M. M. S. Statel, M. M. S. Statel, S. M. S. L. Baphille, Montreal, Com. H. H. Kerz, Calary, Merchander, M. S. Statel, M. S. Statel, M. M. S.

VOI III

PAWTUCKET, R. I., NOVEMBER, 1912

No. 11

NEW YORK DEPARTMENT STORE DELIVERY.

Motor Vehicle Equipment of Frederick Loeser & Co., Maintained to High Efficiency Standard, Affords Ideal Service and Displaces Animals After Comparative Work That Permits Absolutely Accurate Determination.

By William W. Scott.

THE business man whose sales must be delivered to his customers realizes to a greater or less extent the need of economy in labor and time, and seeks to minimize so far as this may be practical with his facilities and resources. It is natural enough for him to stimulate custom by expeditions delivery, and yet competition makes imperative a service that may tronage. Not only must accommodation or conveniencing enstomers be considered, but expedition is a potent factor. While it may be said that this principle will apply with reierence to all localities, the delivery of merchandise sold in a present-day department store in New York City becomes a problem of first magnitude. The city is the largest in America. The



Section of the Londing Shed of Frederick Losser & Co., in Schemerhorn Street, Where the Wagons Vee Unde Rendy for the Routes.

be regarded as costly. This same competition limits prices and minimizes profits, and with a comparatively small variance in the cost of goods it is essential that expense of every character be kept at the lowest possible figure. In other words there is a limit to profit and expense must be minimized.

With the large business enterprises of today haulage and delivery is not incidental. Upon delivery, quite as much as upon quality and price, depends pa-

distances within the municipality itself are great. The volume of transactions is extremely large, the location of the city is such as to congest population, business and highway traffic, and the overflow from the island of Mauhatan has been in every direction, following the line of least resistance.

The greater part of the business traffic is by daylight. There is a proportion of haulage during the hours of darkness, but this is comparatively small. The department store is a concentration of a number of small enterprises for the convenience of the people and to encourage purchasing. While such a store may be conducted by an individual or firm, it may also be composed of departments leased by and directed by different persons who make their own purchases, but the delivery in such establishments is maintained for the benefit of all by the management. Usually with stores of this character the delivery is provided for in the lease or rental. There are other stores in which the departments are divisions under superintendents and the whole organization directed by an executive or executives.

No matter what the form, however, the business is transacted in a single establishment, and from this de-livery is made to any part of the municipality or its suburbs. Competition impels this attention to any customer, no matter what the weight or bulk of the parchase. The department store is an American institution and the development has been to remarkable poportions. In New York such businesses may be said to be developed to the height of merchandizing. They are the greatest achievements of contemporary commer-

experience dictates is necessary to meet the variable purchasing resultant from special sales, for it is the belief of most of the store managements that notice of inducement of special character is necessary to attract patronage. It is necessary to have facilities that will permit delivering in localities where there is not a sufficient volume of business to justly the maintenance of the regular service. Besides this there is the haulage of stock from different shipping and railroad terminals to the warehouses and to the stores; part of this work is done by concerns from which purchases are made.

Obviously, the purpose of the store is to maintain what will be the most economical from every point of view. Animal vehicles have been generally accepted as the most practical because they are better known and understood, while mechanical wagons have been regarded as experimental. While it is true that automobile wagons have been used in New York since ISRK, having been first utilized by B. Alman X Co., these were for years regarded as being expensive as compared with horse vehicles, and were productive largely from an advertising point of view. The ex-



Pari of the Electric Wagon Eunipment of Frederick Lorser & Co., Used for Regular City Delivery.

cialism. They are the results of serving the people at all times, meeting every demand and stimulating patronage by carefully conceived attention.

While it is true that the growth of New York's wholesale section and the expansion of the city has impelled the location of the large emporiums close to the principal transportation terminals, and removal to what may be regarded as the "shopping district," such changes have no influence upon the delivery requirements other than to compel systems that will be in every way efficient over largely increased areas. With the department store of large proportions delivering the purchases has become a science. The customer may buy a pair of gloves or the complete furnishings of a home. The service must be such that it will deliver either purchase without delay, placing the goods in the possession of the purchaser in the same condition sold and at the least cost to the house. The delivery may be 100 yards or 100 miles distant. No matter what the requirement through the sale, the system must be adequate and sufficient.

The department stores usually own delivery equipment sufficient for normal needs, with such reserve as perience of the majority of the department stores of New York that today have motor delivery equipment has been within a period of 10 years, and it may be stated that the larger part of these early installations were electric, as the manufacturers of gasoline vehicles did not until later regard the industrial market of sufficient importance to justify the production of wagons commercially.

Of all the department stores in New York none has more representative delivery equipment than Frederick Looser & Co., Brooklyn, which is made up of electric and gasoline wagons and trucks, and horse vehicles. Eight years ago the firm used 300 horses, and today it has but 96 in its service, though the business in that period has materially increased. The 204 animals have been replaced by 28 electric and 14 gasoline machines, but considering the development the motor vehicles do much more than the work that could be accomplished by the number of horses stated. The motor wagons have increased from year to year and the horses have lessened. The firm has been long established. Its store is a mammoth five-story structure that covers an entire city block, and the delivery department is contained in the sub-basement and basement of a 10-story warehouse reached by a subway beneath a street behind the main building. In the rear of this warehouse is the loading and delivery yard, covered by a roof, where the goods are received or sent out.

It will be understood that this condition is ideal in that the warehouse is practically a part of the main store and may be drawn upon as conveniently as though it were not separate, in that the wagons may be withdrawn from the street during the period of loading and unloading; in that the goods are not exposed to the weather; in that there is no interference from traffic; in that storms do not affect the work; in that there is abundant protection from theft. With the stores that are located in what is known as the "shopping district" of New York the value of real estate is such that the maintenance of a loading shed and a warehouse of such a type and proportions as those used by Frederick Loeser & Co., is absolutely out of the question. For this reason it may be said that this concern has facilities that are extremely favorable.

ited at the examining or packing station. These are later removed in earriers or "wheelers," these being large baskets on rolls, to a central collection point, where they are piled indiscriminately. In the event of individual purchases the packages are indicated by the labels, and where they are purchased by "travellers" books they are designed by special labels.

From the main collection point the goods are sent by a conveyor to the delivery department, where the packages are passed upon by an authorization clerk, whose duty is to establish the correctness and the validity of all charge purchases. Paid and C. O. D. packages are not passed upon by this clerk. The packages then go to route clerks, who mark upon them the numbers of the delivery routes that will carry them out. In the event of "traveleters" the packages are collected and wrapped and if there are several packages for one address these are indicated by the labels. The packages are then conveyed to the "post office" where they are sorted by routes and placed in bins in compartments separated by wire grating, and the delivery sheets are made out in triplicate. The sheets account for each



Some of the Fleet of Packard Wagons of Frederick Losser & Co, at the Garage in Quincy Street, Brooklyn, N. Y.

Yet it will not be denied that these are economical. Still, these do not materially influence the efficiency of the delivery system.

The loading shed or house is so arranged that it may be entered from either street, though it may be said that its main entrance is in Schemerhorn street, and the drivers may enter or leave from either entrance. It covers a considerable area, and in it the automobile and horse vehicles may be arranged in four lines so that the loading may be done expeditionsly. The yard is paved and it is lighted by are lamps whenever the work requires, for it is necessary for quick handling that the men read the directions on the packages almost at a glance. There are no platforms in the yard, the goods being brought out between the lines of wagons and handled by the two men that constitute the crew of each vehicle.

The Loeser store employs roughly something like 3000 persons and there are 66 different departments, each of which is a seperate division. When the purchase is made the goods are passed to an examiner and packer, and after being wrapped or packed are depospackage, and one of these is received by the crew of each wagon. This brings the goods up to the point where the actual delivery is begun.

In the delivery of a department store of the proportions of Loeser & Co., the division is under the direction of a superintendent of delivery, who is responsible for the distribution of the goods, and according to the policy of the management, which primarily is with reference to time, as this element enters into competition quite as much as does distance or condition. The superintendent must have intimate knowledge of the streets of the city and the suburbs. He must have a map of each locality constantly before him. He must understand the conditions of the thoroughfares with reference to traffic and paving, and he must know the possibilities of his equipment under normal and unusual demands. He divides his service into two classes -the regular and the special-for the city service, and he must make provision for the transportation and the handling of the goods sent to the suburbs and to the distant destinations.

The city delivery is ordinarily made up of routes on



Ao. 115, an Electric Vehicle Wagon That Has Been in Service for About Eight Years

the basis of number of packages to be carried and distributed, and the custom with the suburbs is to take large loads to certain points as the patronage justifies, where the packages are sorted and carried out on routes as are those of the city. The haulage between the store and the suburban points of distribution is by what is known as transfer. This service is by vehicles of large capacity that make the hauls rapidly and eliminate the need of each delivery vehicle hauling from the store. In some of the transfer points or stations a number of vehicles are kept and much the same system is maintained as at the store. In others the goods for delivery are sent by express to agents who handle whatever is necessary, quossibly doing the work alone

The city aid the suburban delivery is a regular service, but in addition to this may be the special distribution, consisting of furniture, pianos, or goods of similar character. Besides this there is the delivery of orders that may be authorized by the head of the department where the purchase was made, and which is based on a request made by

the purchaser. The purchaser may buy conditionally moon the goods being delivered within a specified time, and it is necessary to insure the sale. There is normally variable purchasing and the volume of delivery must correspond to the sales.

The delivery equipment of the store of Frederick Loser & Co., is kept in a stable in Quincy street. The brick and stone barn of three stories was built to house more than 300 horses and the wagons sufficient for the animal service. The ground floor of the building is divided equally, a half for each type of vehicle. No. I houses the horses and

No. 2 the machines. On the upper is located the repair shop for all wagons and automobiles. The crew of each wagon consists of a driver and a conductor, the driver being the older and more experienced and the conductor the younger and probably less versed in the work. The men are given uniforms and caps that they wear while on duty, and those working with the motor wagons wear dusters to protect their clothing. All drivers and conductors report at 7:15 each morning and the stable help has the

horses in readiness at 7:30. The electric automobiles are ready for leaving at the same time. The electric and horse wagons are supposed to start at 7:30 and five minutes later all are away, the motor vehicles by one route and the horses another, to avoid confusion and street congestion. Reaching the loading yard at 7:20 to 7:245 the drivers and conductors obtain their delivery sheets and each crew is given a key to a cage or bin, the cage and the route numbers being the same.

The contents of the bins are checked as they are removed and placed in "wheelers" that are covered and locked. The "wheelers" are then taken to the loading shed where the wagons are standing in four lines. The packages are then taken from the "kneelers" and checked as they are "stacked" in the wagons, this process being the packing in the order of delivery. The route may include as few as eight city blocks, and it may cover as many as 40, the number of bundles governing the work to be done. The wagon starts at a given point and traverses the streets in the order specific



No. 114, a Vehicle Equipment Wagon in Transfer Service—This Machine Has Been in Use for Eleven Vents.



No. 116, a Rebuilt Electric Vehicle Machine Equipped for Emergency Work and Unpublic of Hauling Five Tons.

fiel, the work ending at another point. One route may take in one side of a street and another route the other. After the goods are placed in the wagons and the sheets verified the start is made, those laving the longest distance to go starting first, so that as a rule distribution is begun about the same time except in the suburbs.

The system of Frederick Loeser & Co., requires

that the three-trip wagons return to the stable and garage after the first trip, and from 11 to 12 the vehielse return. After an hour for bunch the wagons again report at the store and when loaded are again dispatched over the same routes. When this delivery has been completed the wagons report at the store for the third and last boads of the day, leaving about 4:30. When the final delivery has been made the wagons return to the garage and stable, where the drivers and

conductors turn in the receipts from collections to the cashiers and the undelivered paid packages to the credit clerks. Then the wagons are searched for bundles that may have been overlooked. The following morning the packages that were not delivered the previous day are turned over to the delivery department and go through the same process as in the original distribution, so there is no uncompleted work to be accounted for. Each day's work is new. Mondays and Saturdays there is some variation from the schedule as stated with reference to the work accomplished, but the system is unchanged. This accounts for the work of the electric and horse wagons, but some may make only two trips when the routes are distant.

With the gasoline machines the distances traversed are longer. They are generally utilized in the transportaton of jurniture, pianos and bulky goods, and leave the garage not later than 9 each morning. Of course they do not return unless the work is within a rea-, sonable distance. From the store Brooklyn and Manhattan are covered with regular deliveries. There is one delivery daily in the Bronx, and one delivery is made each day on Long Island nearly to Freeport, in the Rockaways, Flush-

ing. Flatbush. Parkville. Bath Beach and Union Course. Besides these there are the special deliveries. Goods are carried to these points by automobile wag-ons and distributed by horse wagons. Electric trucks are used generally for transfer service and they leave the garage at 5, reach the store at 5:10, are loaded with locked "wheelers" or crates and are sent away at 6:30. These goods are ready for delivery in the suburbs at the same time as in the city.

The brief outline of the character of the service has been given that there may be understanding of the work performed by the different vehicles. As stated, the route may be very short and the deliveries numerous, while it may be of considerable length and with less frequent stops. When the work of a route so accumulates that the number of packages carried cannot be handled promptly in the time allowed adjustment is



No. 119, One of the Unusual Designs of Body I sed with a Vehicle Equipment Channis.

made to equalize the loads. As might be assumed, this adjustment is frequent. In the summer, when the business transacted is diminished, the crews are given vacations and the routes increased, advantage being taken of this opportunity to withdraw the vehicles to make them ready for the coming year's service. During the holidays and perhaps other periods when the delivery is very heavy additional vans and wagons are hired and utilized so long as the press is manifested. During such times of unusual service one old man is always placed on each extra vehicle, and as each driver and conductor is expected to know his route thoroughly such changes do not lessen the efficiency of the work.

In the service of Frederick Loeser & Co., the garage and stable is in charge of a superintendent, who is responsible for the equipment until it is placed at the disposal of the superintendent of delivery. The effi-

DRIV	ER'S	REPORT.			
	Date				
Vehicle	Dept.				
Time Out	A.M.	Conditions			
Odometer Start					
Time In	A.M.	Conditions			
Odometer Finish					
Total Miles					
Remarks:					
	Signed	1			
2600i			_Driver		

ciency of the delivery depends upon the vehicles, and

these must be maintained with extreme care. The answer to the experience of the concern with motor wagons is the number it has in use and the constantly diminishing horses. Economy and Loeser service are the two essentials. The delivery could be made with two daily trips on the city routes. The third is made for the benefit of the customers. There would probably be some saving were but two deliveries made, but this would not best serve the firm in maintaining its policy. This fact is emphasized to make clear that there are other considerations than mere economy entering into the administration of a large enterprise.

Having stated this standard of efficiency it will be interesting to follow the vehicles-the motor wagons-

through the attention given them. The 28 electric wagons vary in capacity from 1000 pounds to 3.5 tons, and the 14 gasoline machines from 1.5 to five tons. When the wagons reach the garage at night from 6 to 7 they are driven to a washstand, where two washers go over them thoroughly, and when washed the electrics are placed on charge. Usually charging is begun at 7 in the evening and as there are 27 receptacles this work is done simultaneously. While the charging is progressing the night mechanic goes over the machines. All of the electric wagons are oiled each night and are greased at regular intervals. With the attention indicated as necessary from the reports of the drivers all are in readiness each morning.

When the driver reports at the garage at night he makes out a report on the accompanying blank, this indicating the condition of the machine during the trips of the day. This report may show the need of trifling adjustment or restoration, and this work is taken up according to the demands of the task. If it is found that the work is beyond the capacity of the night force this is held until the following morning for the day mechanic, who is in charge of the repair work. The night mechanic has supplies for ordinary requirements, but withdrawals from the stock room are made only by the day chief.

The daily report card is dropped in a basket in the office. It is taken by the night mechanic, and after he has examined the machine and made such adjustments or restorations as are required to make it serviceable he turns the card over to the man who charges the vehicles. As will be noted from the accompanying form, the charging report is made out to cover each of the 24 receptacles or stations, and under the switch number is given the vehicle number and the open circuit voltage as shown. The voltmeter and ampere meter readings are taken every hour, and a note is made of the ampere-hours for each period in three separate columns under the switch number. Below is a space in which is noted the total ampere-hours of the charge. The name of the man taking the readings is signed to the report. Under this note is placed the number of miles run by the vehicle on charge during the day. From the driver's report and the statement made by the mechanic an entry is made under "Remarks," so that examination of the charging sheet by the superintendent shows him the condition of each vehicle when he reaches the garage in the morning. For further detail he may consult the driver's report. If a breakage has developed that requires more attention than could be given by the night force this is taken charge of by the day mechanic.

It is seldom that a wagon is withdrawn from service. The reports and the examinations while the machines are being oiled and greased are usually sufficient to meet all probable causes for failure, and periodically the wagons are gone over to insure the observation of what might have escaped the usual inspection. The batteries are kept in repair and maintained at a standard efficiency by the battery man, and the policy is to purchase material and build the lead batteries, this having been found economical. This season, however, a change has been made and all of the wagons have been fitted with Edison batteries, the lead batteries being continued for the trucks. The charging board is located in the centre of the rear wall of the main garage floor, and while this now has equipment for 27 receptacles, it is to be increased to 35, which will considerably exceed the present needs. The company for a considerable length of time produced its own current, but when the gasoline engine generating plant was outgrown it was believed best to purchase current from the commercial lines of the Brooklyn Edison Company.

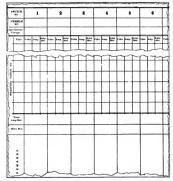
In the repair department of the electric wagon garage is kept a small supply of such parts as might be needed from time to time. As the machines are General Vehicle, Vehicle Equipment and Electric Vehicle wagons, it will be understood that it is possible to obtain spares of the first two makes with great ease, and provision has been made for any exigency that might arise with the last make named.

The gasoline wagon department has been conducted three years with entire success by a system that has minimized cost to a surprising degree. All of the drivers of these machines are hired with the understanding that they are to care for and keep their machines operative. The wagons are driven into the garage at night and are washed. They are not given attention until the next morning, unless the drivers want to do work on them. The drivers report at the same time in the morning as do the drivers of the electric wagons, but they have an hour and a half before starting to work on their machines. In exceptional cases two hours might be allowed, but the nen are expected to leave by 9 unless there is sufficient reason for working another half hour.

With this time permitted before starting the machines are always in use, unless in the case of breakage, but it is rare that anything serious is developed, for the constant and systematic care each day is an admirable insurance. As an illustration of the possibilities it may be stated that one machine was driven for 22 months before it was overhauled, and in that time never missed a day. The mileage for the gasoline wagons will average 45 except in the spring months, when it will range from 60 to perhaps 70, for there are numerous deliveries made in the country and at the shore. It will be seen that with an average of approximately 50 miles daily for about 50 weeks the total is not far from 15,000 miles a year.

The electric wagons are used on the city routes and the transfer service and the mileage will vary materially, because nine of the routes are comparatively short, yet the customers are close together and in numerous instances deliveries are made at a number of houses side by side. These are known as "peddling" routes and the men are kept very busy, though driving short distances. When the loads are "stacked" the conductor rides at the rear on a seat and he calls the

number of the street, to which the machine is driven. In the city delivery the loads are placed in and taken from the wagons at the rear. The experience has been that in the practical use of the electric wagons faster and better work can be done than with horses from the fact that the driver and conductor can distribute the load, both visiting customers. As it is necessary for a customer to sign a receipt for a package if a charge or paid account, or pay if it is a C. O. D. purchase, it will be seen that time is required. In the event of goods sent on approval there is a receipt to be signed. When a horse is used the orders are for the driver never to go out of sight of the animal, which precludes more than one man working in actual delivery, and more time is necessary in covering a given route. Not only this, the speed limit is nine miles an hour for a horse against 15 miles for the electric, so on



Charging Record for Electric Wagons with Provision for 24 Entries, on Sheet 11.5 Inches Length and 27.5 Inches Width.

the routes where the deliveries are more scattered the latter has a decided advantage.

In the periods of heat or where the streets are obstructed by snow or traffic, the motor wagons have been found to give admirable satisfaction, being tireless and always sufficient in capacity to meet any requirements. Some of the electrics have been used for years. Eight years ago there were three in service, one being a Vehicle Equipment machine and the other two Electric Vehicle wagons. One Electric Vehicle wagon of 4000 pounds capacity is used as a transfer between the store and the distribution station at Parkville, a distance of eight miles, and while it has been in service 11 years it is regarded as doing work that is quite as important as any machine operated. It is driven more than 30 miles each day and has been driven frequently from 35 to 40, while it has carried a full load 32 miles. This work is the more creditable when it is understood that it has to climb a hill of considerable length on a 10 per cent, grade,

The electric wagons have been found to endure remarkably under the conditions of usage and they have been maintained at a very satisfactory cost. One of the reasons for the machines enduring consistently is that annually, between July 4 and Labor Day, each wagon is taken down and thoroughly overhauled. It is made ready for a year's service, and after it has been placed in fine condition and the body painted it is ready for use for many months. During the same period the gasoline machines are given similar attention and if the driver wants to do this work during his vaeation he is paid for this in addition to receiving his regular vacation pay.

The instruction is that when the vacation season has ended every vehicle must be in the best condition possible. Nothing is neglected to insure the wagons being in readiness for a year's work. That is a part of the firm's policy. Constant maintenance is the price of efficiency, but it is profitable.

Were one to inspect the machines of the older type in use there would be surprise at the conditions found. There are little evidences of wear, and the designs would be the only reason for attention being directed toward them. Several of them are old, in fact veterans of motor vehicles, but they are always serviceable. One of the wagons that is always regarded with interest is the emergency machine, which has the batteries arranged along the sides of the body, and this is an Electric Vehicle wagon that has the power to haul five tons. Another vehicular curiosity is the Vehicle Equipment wagon that has a peculiar cab design.

The experience of Frederick Loeser & Co., is that in department store delivery, in the routes where it would be maintained by many users of motor wagons lurses could be more economical, that the electric is ideal for the service. The electric has given equal satisfaction for transfer service. When the runs have been for comparatively long distances the gasoline machines have been found extremely practical. Both lave been proven in the work for which they are adapted to be decidedly superior to horse haulage. There is a large measure of economy in careful upkeep and maintenance. The reason for the success of the motor delivery of Loeser & Co., is the care given the equipment and the commonsense method of its utilization.

NEWS OF THE COMMERCIAL VEHICLE INDUSTRY.

Maker of Kelly Truck Changes Name to Kelly-Springfield and Increases Capital Stock---Future Plans of United States Motor Company---Chicago Show Exhibitors.

The Kelly Motor Truck Company, Springfield, O., maker of Kelly trucks, has been completely reorganized and refinanced, according to the plans recently announced by President E. S. Kelly. Papers have been filed with the secretary of state incorporating the Kelly-Springfield Motor Truck Company, as the concern will be known in future. The authorized capital is \$2,500,000, while that of the old corporation was \$450,000.

The new company has taken over the plant and assets of the Kelly Motor Truck Company, which formerly was the Oscar Lear Motor Car Company, and the principal stockholders are E. S. Kelly and J. S. Crowell, both of Springfield. The object of the concern, which is being financed by Emerson McMillan & Co., a New York City banking house, is to increase the facilities of the plant, which had an output of 1200 trucks during the present year.

SATISFACTORY REORGANIZATION PLAN.

Stockholders of United States Motor Company Will Be Assessed \$24 a Share.

It is stated that all interests affected by the reorganization of the United States Motor Company, New York City, which went into the hands of receivers Sept. II, have agreed upon a reorganization plan under which the stockholders will be assessed \$24 a share on the preferred and common stock of the parent organization and on the preferred and common stock of the Columbia Motor Car Company, Hartford, Conn., one of its subsidiaries. It is understood that the total capitalization will be scaled down as follows:

For and in consideration of the \$24 assessment, the new company will issue in exchange for the preferred certificates 24 per cent, of new first preferred, 25 per cent, of the second preferred and 50 per cent, of common. This assessment means that the new company will start out with a clear capital for working operations of about \$3,000,000. It is proposed to raise by this method the sum of \$5.720,000. The remainder will be used for funding the matured obligations.

At this time there is still remaining in the treasury of the company the sum of \$1,000,000. The distribution of this fund was one of the chief matters of contention in the deliberations of the merchandisc creditors. It is understood that a compromise has been reached, whereby these creditors will receive 25 per cent, of their claims in cash, 25 per cent, in first preferred, 25 per cent, in second preferred and 15 per cent, in common, thus making a settlement of approximately 90 cents on a dollar.

All first and second preferred stock of the new company and all common stock other than shares reserved to qualify directors is to be vested for a term of not exceeding five years in Charles H. Sabin, Harry Bronner and lamse C. Brady, and their successors as voting trustees, and voting trust certificates in such form as may be determined by the committee will be distributed in fleu of stock. Voting trust certificates are intended to be distributed to creditors and stockholders participating in this plan substantially as follows:

First Preferred Stock.	
To depositing holders of debenture bonds and bond	
serip (50°,)	3,050,755
for depositing holders of claims against the Motor	
company only (25%)	475,506
Fo depositing stockholders of the Motor company and	
of the Columbia company duly paying the assess-	
ments hereinafter provided for:	
referred stockholders (24';)	2,743,152
Sommon stockholders (24%)	
Total	0.011.051
	9,211,651
Second Preferred Stock.	
To depositing holders of debenture bonds and bond	
serip (for)	3,080,755
To depositing holders of claims against Motor com-	
pany only (25%)	475,906
To depositing stockholders of the Motor company and	
of the Columbia company duly paying the assess-	
ments herelnafter provided for:	
Preferred stockholders (25%)	2,878,283
Common stockholders (17% 7)	2.156.761
Total	307 192 vi
Common Stock.	
To depositing holders of debenture bonds and bond	
serlp (40',)	12.464.604
To depositing holders of claims against Motor com-	
pany only (15%)	285.543
To depositing stockholders of the Motor company and	
of the Columbia company duly paying the assess-	
ments hereinafter provided for:	
Preferred stockholders (30%)	2.453.940
Common stockholders (30%)	

WILLYS WITHDRAWS SUIT.

Trouble with Former Officials of Gramm Motor Truck Company Is Amicably Settled.

The action instituted last August by John X. Willys, president of the Willys-Overland Company, maker of Overland cars, against A. K. White and W. T. Agerter, formerly president and treasurer, respectively, of the Gramm Motor Truck Company, Lima, O., maker of Gramm trucks, has been settled amicably, according to an announcement from Toledo. O.

Mr. Willys alleged in his complaint that the values shown in the statements under which he purchased the stock of the Gramm company from White and Agerter, were not correctly represented and sued for a resemblement of the purchase contract. The matter has been settled by a readjustment of values, which, by his consent to a withdrawal of the suit, is apparently satisfactory to Mr. Willys.

BUY PEERLESS STOCK.

Five Men Prominent in National Electric Lamp Company Powerful Factors in Automobile Firm.

Substantial blocks of stock have been purchased in the Peerless Motor Car Company, Cleveland, O., maker of Peerless pleasure and commercial cars, by five of the men most prominent in the National Electric Lamp Company, Cleveland, O., a branch of the General Electric Company, They are H. A. Tremaine,

B. G. Tremaine, J. B. Crouse, J. R. Crouse and F. S. Terry, and they now form a powerful factor in the affairs of the automobile manufacturing concern.

There will be no alliance between the corporations, as such, but the experience and connections of the lamp men will furnish important impetus to the development of the Peerless company's business. Besides 20 acres of property in Cleveland, the Peerless company owns the ground and nine-story building on Broadway, New York City.

BECOMES FEDERAL EXECUTIVE.

Garvin Denby Is New Secretary and Treasurer in Charge of Sales Department.

Garvin Denby, prominent in business circles in Detroit and the East, has been added to the executive staff of the Federal Motor Track Company, Detroit, maker of Federal trucks, his position being secretary and treasurer with

general charge over the sales department, Mr. Denby has achieved much success in his previous business connections. He began his career in 1897 when he started with the Gilbert Wilkes Company of Detroit, in the electrical and engineering department. He passed two very successful years with this concern until the when he was ap-



spring of 1899, Garvin Denby, Secretary Federal Mo-

pointed attache of the first Philippine commission under Chairman Schurman, spending a year in the Insular possessions.

He left the government service in 1900, joining the forces of the Solvay Process Company of Detroit. He was appointed assistant in the soda ash department, where he was successful, being transferred in 1907 to the head offices at Syracuse, N. Y. His past excellent record resulted in his choice for assistant to the president, which position he occupied until joining the Federal Motor Truck Company.

NEW RUBBER CONCERN.

Well Known German Firm of Polack Tire & Rubber Company Will Establish Factory at Bridgeport.

The Polack Tire & Rubber Company, Waterhausen, Germany, with branches at Sydney, Australia; London and Paris, is expected to locate a factory at Bridgeport, Conn., for the manufacture of its product, the Polack solid rubber tire for motor vehicles. The concern has secured a building owned by the Bridgeport Copper Company, which is being remodelled to receive the heavy machinery necessary for the work. This will be installed immediately after its shipment from Trenton, N. J., where such machinery is made.

Herman W. Polack, grandson of the founder of the German company, B. Polack, will be vice president of the American concern and is said to anticipate having the factory in operation in the near future. The German company was organized in 1863 and grew gradually until the advent of the motor car industry, since which time it has found a market all over the world for its rubber tires.

CHICAGO TRUCK SHOW.

Exhibition Space Taxed to Utmost and Display Will Be More Comprehensive Than Ever.

Exhibition space at the Chicago show, to be held Feb. 10-15, has been allotted to 65 commercial vehicle manufacturing companies. These drawings took all of the ground floor space of the Coliseum, Coliseum Annex and First Regiment Armory, with the exception of five of the least desirable spaces comprising about 2500 square feet. Three of these spaces have since been taken and there are still six applicants on the waiting list, as follows: Mogul Motor Truck Company, Chicago; Mercury Manufacturing Company, Chicago; H. J. Koehler S. G. Company, New York City; Ideal Auto Company, Fort Wayne, Ind.; Kentucky Wagon Manufacturing Company, Louisville, Ky.; Ware Motor Vehicle Company, St. Paul, Minn. Of these, the Mogul Motor Truck Company and the Mercury Manufacturing Company have exhibited before at Chicago and the Koehler company exhibited at the Grand Central Palace show in New York last win-

The situation indicates that the exhibitions this season will be considerably larger than those a year ago and in all probability it will be necessary to utilize the basement under the Annex for the first time at the truck show. There will doubtless be numerous befated applications between now and the opening of the display, which can be taken care of in no other way. There will be no motorcycle section this winter and the centre of the second floor of the Annex occupied by it will be filled with motor car parts and accessories, so that this part of the show will be more comprehensive than heretofore. Most of the members of the Motor & Accessories Manufacturers will continue their displays from the first to the second week and there will be many sundries displayed by unaffiliated concerns.

In the accompanying list of complete vehicle makers already allotted space are 10 that are new exhibitors at Chicago. These are: Brown Commercial Car Company, Buffalo Electric Vehicle Company, Four-Wheel Drive Auto Company, Gramm-Bernstein Company, Krebs Commercial Car Company, Lippard-Stewart Motor Car Company, D. F. Poyer & Co., Standard Motor Truck Company, Transit Motor Truck Company and Universal Motor Truck Company, It will be noticeable, therefore that the large companies have extended their lines and are offering a wider range of capacities than formerly. In some cases they have added electric vehicles to the gasoline truck lines or gasoline trucks to their electric lines. The complete list of exhibitors follows:

Collaram.

Adams Bros. Company, Findiay, O., Adams. American Locomotive Company, Providence, R. I., Alco. Autocar Company, Ardmore, Penn., Autocar, Buffato Electric Vehicle Company, Buffato, N. Y., Buffato elec-

trie.
Bulck Motor Company, Flint, Mich., Bulck.
Clark Delivery Car Company, Grand Crossing, Ill., Clark.
Dayton Auto Truck Company, Dayton, O., Dayton.
Federal Motor Truck Company, Detroit, Mich., Federal.
Filial Motor Wagon Department, Durant Dort Carriage ComFilial Motor Wagon Department, Durant Dort Carriage Com-

Find Motor Wagon Department, Durant Dort Cartings Com-Garford Company, Blytia, O., Garford, General Motors Truck Company, Pontlac, Mich., G-M-C. Gramm Motor Truck Company, Lima, O., Gramm, Hupp Motor Car Company, 1etroit, Mich. Hupmoble, Motor Company, New York City, Mack, Hewitt, Surger,

Thomas B. Jeffery Company, Kenosha, Wis, Jeffery, Kelly-Springheld Motor Truck Company, Springheld, O., Kelly, Kissel Motor Car Company, Hartford, Wis, KisselKar, Krelss Commercial Car Company, Clyde, O., Krebs, Lucomobile Company of America, Bridkeport, Conn., Locomo-

bile.
W. H. McIntyre Company, Auburn, Ind., McIntyre.
Old Reliable Motor Truck Company (formerly Henry Lee

old Reliable Motor Truck Company (formerl) Henry Lee Power Company), Chicaco, Old Reliable Feerless Motor Car Company, Cleveland, O. Peerless, Peerless Motor Car Company, Cleveland, O. Peerless, Pope Manufacturing Company, Hartford, Comp. Pope-Hartford, Ros Motor Car Company, Lamina, Mich. Res. Sternberg Manufacturing Company, Milwauker, Wis, Sternberg, Sperdwell Motor Car Company, Dayton, O., Spoedwell, Sperdwell Motor Car Company, Dayton, O., Spoedwell, Philid States Motor Truck Company, United States, Volle Motor Vehicle Company, Mollar, Ill., Velle, Waverley Company, Indiana, plant, Marting Company, Child Waverley Company, Indiana, plant, Marting C

oliseum Annex.

Rowling Green Motor Car Company, Rowling Green, O., Modern, Chase Motor Truck Company, Syracuse, N. Y., Chase, Dart Manufacturing Company, Waterloo, Ia., Dart, Lippard-Stewart Motor Car Company, Buffalo, N. Y., Lippard-

Impara-sevent autor (Company, Burnato, S. 1., Lippara-Stewart, M & P Electric Vehicle Company, Detroit, Mich., M & P electric, Service Motor Car Company, Wabash, Ind., Service, Standard Motor Truck Company, Detroit, Mich., Standard.

Standard Motor Truck Company, hetroit, Mich., Standard, Transit Motor Truck Company, inc., Louisville, Ky., Transit, Universal Motor Truck Company, Deiroit, Mich., Universal,

First Regiment Armory.

Avery Company, Peorla, Ill., Avery,
laker Motor Vehicle Company, Cleveland, O., Baker electric,
Beasemer Motor Track Company, Grove City, Penn, Bessemer,
Howar Commercial Car Company, Feru and, Brown,
Chicago Thourastic Company, Peru and, Brown,
Chicago Thourastic Company, Collegio, Little merce,
Pour-Wheel Drive Auto Company, Clintonville, Wiss, Four-

Wheel Drive.

General Vehicle Company, Long Island City, N. Y., G. V.

Gramm-Bernstein Company, Lima, O., Gramm-Bernstein.

Harwood-Harley Manufacturing Company, Marion, Ind., Indiana.

International Harvester Company, Chicago, International.

Lauth-Juergens Motor Truck Company, Fremont, O., Lauth-

Juergens.
National Motor Truck Company, Bay City, Mich., Natco.
Packard Motor Car Company, Detroit, Mich., Packard.
D. F. Poyer & Co., Menominee, Mich., Menominee.

Alden Sampson Manufacturing Company, Detroit, Mich., Sampson. Sanford Motor Truck Company, Syracuse, N. Y., Sanford. A. O. Smith Company, Milwaukee, Wis., Smith.

White Company, Cleveland, O., White.

TESTING EFFICIENCY OF WORM GEARING.

OWING to the fact that a number of American manufacturers have produced worm driven trucks during the past two years, and that such construction is to be found quite generally on commer-



Fig. 1—Accountement of Testing Apparatus, Showing Transmission Dynamometer Set Up for Comparison with Aiden Brake.

cial cars of foreign makes, it must be assumed that the industry in this country is considering the subject with more or less interest. Herewith is presented the report of William II. Kenerson, Providence, R. L. a member of the American Society of Mechanical Engineers, respecting a series of trials conducted at the plant of the Brown & Sharpe Manufacturing Company, Providence, with a view to determining the efficiency of worm gearing for automobile transmission systems. While there does not appear to have been any attempt to limit the investigation to the commercial type of automobile, the results obtained cannot help but be of interest to all makers and users of mechanical transports.

By William H. Kenerson.

This investigation was made at the plant of the Brown & Sharpe Manufacturing Company for the purpose of determining the efficiency of three types of worm gearing for use in an automobile transmission system, and the heating effect due to continuous running. The power for these tests was obtained from a 50 horsepower induction motor, running approximately 870 revolutions a minute at full lead.

Between the motor and the worm gearcase was placed an automobile transmission gearcase to enable tests to be made at two lower speeds. Between this and the worm gearcase was placed a transmission dynamometer designed by the author. An Alden brake was used to absorb and measure the power transmitted by the gears under test. The arrangement of the apparatus is shown in Fig. 1, which shows the transmission dynamometer set up for comparison with the Alden brake, and in Fig. 2, which shows the whole apparatus mounted ready for testing the worm gear efficiency. Referring especially to Fig. 2. A is the motor, B the automobile transmission gearcase. C the transmission dynamometer, D the case containing the worm gear under test. E the Alden brake and F the platform scale which measured the load on the Alden brake.

The apparatus was so arranged that as the load was imposed the weight on the platform scale was removed and all vibration of the scale beam was climinated by interposing springs S between the blocks FF, which sustained the weight on the scale, and also by su-spending by a wire from the weight at the end of the scale beam a plate which dipped into a pail of oil, thus acting as an efficient dashpot. It was found possible by careful manipulation to maintain a steady and easily read load on both the transmission and absorption instruments.

The transmission dynamometer and brake were first compared by arranging them as shown in Fig. 1, in which position runs were made at various loads, and the torques corresponding to horsepower at 100 revolutions a minute marked on the dial of the transmission instrument corresponding to similar loads as indicated on the brake. It is evident that by this method of comparison the two instruments must check each other exactly.

A thermometer placed in the oil well at the back of the worm gearcase D indicated the temperature of the oil, and another thermometer placed on the wall near the apparatus indicated the room temperature.

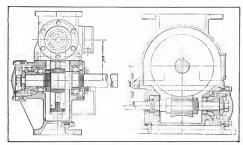
The oil employed to lubricate the gears was one intended for use with superheated steam, having a specific gravity of 26 Baume, flash point 625 Fahrenheit,



Fig. 2-Entire Apparatus Installed Heady for Testing Worst Gear Effelency.

and viscosity at 212 degrees 260 to 265. The case contained about five quarts of the oil.

In all the trials the worm was located underneath the gear. Figs. 3 and 4 show sections through the



Figs. 3-4-Sections Through the Gear Case

gearcase. As indicated, both shafts are mounted on ball bearings and end thrust ball bearings take care of the thrust on the worm and worm wheel. All the worms were made of machinery steel, case bardened, and the worm wheels were of phosphor bronze.

The first worm and wheel tested are shown in Fig. 5, and are similar to those used for driving the spindle on the Brown & Sharpe automatic spur gear machines. This pair of gears is an unusual case of the worm and worm wheel. The smaller gear is hobbed with a hob of the size of the larger gear, thus making possible adjustment of the larger gear, which would not otherwise be the case. While in appearance this gear resembles a Hindley worm, it is not such in reality.

Although not strictly in accordance with usage, the smaller gear will be called the worm and the larger the worm wheel in the following description. Figs. 3 and 6 give the dimensions and a good general idea of this pair. The worm wheel was cut with the cutter shown, and the shape of the teeth on a section through the worm and worm wheel, parallel to the axis of the worm, is also shown. All necessary information pertaining to pairs No. 2 and 3 is given in Figs. 7, 8 and 9. The difference between gears 2 and 3 is principally one of shape of the worm threads. This difference is clearly brought out in the sections of the worm and wheel shown in Figs. 10 and 11.

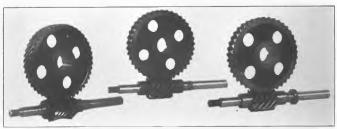
The shape of the teeth on the worm in Fig. 10 was produced with a cutter, the included angle of which was 29 degrees, and the depth of tooth .57 inch. This depth was based on the axial pitch, while the usual method of multiple worms is to base the depth on

the normal pitch. The object in using this cutter was to obtain as many teeth as possible in contact at one time, and also a shape that could be ground with a straight sided emery wheel.

The teeth of the worm in Fig. 11 were cut with a cutter shaped as shown, which is an arbitrary shape made to produce at one instant the greatest effective breadth possible as shown in the figure.

In conducting the trials the load was maintained at the desired point by one observer who adjusted the brake. Readings were then taken on the transmission instrument by two independent observers. The speed of the motor was observed in each case and from this, knowing the gear ratio, all the other speeds were easily computed. Temperatures were taken immediately following each series of observations.

For purposes of comparison a series of trials was run on a pair of bevel gears, the principal dimensions of which are shown in Fig. 12. Table 1 is a record of one set of observations typical of the series. Table 2 is a summary of the results of all the trials, and the curves of Fig. 13 show in graphic form the average efficiency of different gears at various loads and speeds.



Figs. 5-8-9-Warms and Worm Wheels 1, 2 and 3, Respectively.



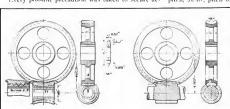
Showing Difference Between Pairs 2 and 3, Respectively,

In conjunction with the efficiency trials a series of runs was made to determine the heating effect due to continuous running. In these trials, which were in eficet endurance tests, a constant load was transmitted through the gearing and the temperature of the oil in the gearcase and the temperature of the room noted at frequent intervals.

From these observations it was found that at the beginning of the run the oil temperature rose rapidly and somewhat irregularly. As the run continued, however, the rise became much more gradual and regular. In the runs where the smaller amounts of power were transmitted a point was reached where the temperature remained constant. This indicated that radiation was sufficient to carry away the heat due to power lost through friction in the gearing, or in other words, that the gears would run indefinitely at the load. The heat curves of the No. 1 worm and gear are shown in Fig. 14.

The higher loads indicated were abnormal for the gears under consideration and would not occur in any use to which the gears would normally be put. The fact that these trials continued for from Ot to 80 minutes without failure indicates that the structure is both strong and enduring and that should such temperatures be reached for any accidental reason the gears would not be destroyed. The result of the trials was oft particular interest because of the very high efficiency and carrying capacity of the gears tested.

Every possible precaution was taken to secure ac-



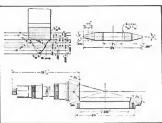
Figs. 6-7-Worm and Worm Wheel I, and Worm and Worm Wheels 2 and 3, Respectively.

Number of Groups of Readings Taken in Table 2.

	Genr No. 1	Genr No. 2	Gear No. 3	411-D
First speed	4	5	5	
Second speed	4	5	5	
Direct	3	5	5	
Western automates and the	142			

curacy in the results, and the high degree of accuracy obtained is due largely to the skill and care of B. F. Waterman of the Brown & Sharpe Manufacturing Company, under whose personal supervision the apparatus shown herewith was erected and all the trials were conducted.

In connection with the illustrations accompanying this report, it should be stated in explanation of Fig. 6 that the worm wheel is of phosphor bronze. The number of teeth is 43, left hand; pitch diameter, 10.95; outside diameter, 11.28; circular pitch, 8; angle of teeth with axis, 45 degrees; normal circular pitch, 5.657; pitch of cutter, 5.553; addendum, J.628 (not standard); thickness of tooth, 282; whole depth, 3882; included angle of cutter, 45 degrees.

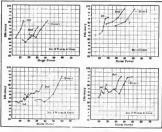


Figs. 10-11-12-Sections Through Pairs 2 and 3, and Sketch of

A similar explanation of Fig. 7 is offered as follows: Worm wheel, phosphor bronze; number of teeth, 40; pitch diameter, 10,5704; throat diameter, 10,9964; circular pitch, 8302; angle of teeth with axis, 82 diagrees 16 minutes five seconds; normal circular pitch, 6518; pitch of cutter, 48196; addendum, 213;

thickness of tooth, 3568; whole depth, 4566. Worm, Aurora Street, case hardened; number of teeth, nine; pitch diameter, 3,015; omside diameter, 3,441; circular pitch, 1,0524; angle of teeth with axis, 51 degrees 43 minutes 55 seconds; thickness of tooth, 295; lead, 7,4719; ratio of wheel to worm, 40 to with

With reference to Fig. 12 the following is presented: Driving pinion, 5 per cent, nickel steel, case hardened:



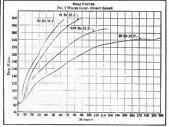


Fig. 13—Charis Showing Average Efficiency of Different Gears at Various Londs and Speeds.

Fig. 14-Chart Showing Heat Curves of Worm and Gear 1.

pitch, five: number of teeth, 14; angle of edge, 15 degrees four minutes; angle of face, 71 degrees five minutes; outside diameter, 3,3359. Driving gear, 5 per cent. nickel steel, case hardened; pitch, five; number of teeth, 52; angle of edge, 74 degrees 56 minutes;

angle of face, 13 degrees 47 minutes; outside diameter, 10.4627.

It may be added that the cutting of worm gears and the solving of their problems are not new to the Brown & Sharpe Manufacturing Company.

	M.	a	B.P.M. Worm Grar	1000	per Min.		faitist Load	Reading on		Lond on Brake 315 Ft. Radius		per 100	M. Drake	Total	0.11.5	Total Trans.	Efficiency of Worm Gears				ratu	enle	asion	Dy	ı. Re	edin		Temp. a			at End Frot		1		Time		
it P.M.	R.P.M.	Worn	Worth		in Ft		Initia	Read	Neal	315		H	4	Tota	Brak	Tota	Uya.	Effe	Worth				2		3	A			Di1	R	oom	1	Lari		Fin	Derestion	
875	83		196 9		90.7 90.1		104	5		49	-	24		(h 43)		19			5	5			65		65 L	5 6			68		5.5		0:1:		10:20		
873	81		198 0		99 I 94 G		104	16		39		19		36		40			4	4			63		6	4 6			76		6		0.2		10:30		
880	80		198 0		H 6		104	7		34			0			36			В		15		1	4		4.1			75	-	16	1	0:30	0	10:33	1 2	
883	81		198 7		97.0	ļ	104	7	5	29		14	S.	2%	N1	31	17	92	4	3	53	3	5.5	3	5	3 5	3	2	73	-	36	1	0:33		10:37	1	
			Eyn N	- 1							da e	n 5	in	,							Ger	DE	No.	3			N N			B	EVEL	. 6					
D	P.M.	1	H.P.		Ten	n.	Eff	1 6	.P.M			LP.	-	Ter	nn.	Eff		16	P.N			(P			mp.	Ef.	1	R.I	P. M.	Ť		LP.			DID.	Eff	
Worte	Worth	1		Output	8	Room		1		Wheel	Input		Output	10	Room			Form	1	Wheel	Input	Ī	Output	li0	Room			Canon	Gent	1	Input		Output	ē	Itoom	1	
					206		91 (254	_	-1	_	-1-		164		95	3						5.30	136	79	95 5			68 4	3 2				-		96	
254	6 65 5 65	3 24	75 22	47	217	73	90 5	254	7 57	32	17 9	9 16	5 91	169	69	94	H:	254	8 57	.33	16.5	4 1	5 48	144	79	93.1	25	4.5	68.0	1 1	7.50	16	.78			95	
254	5 65	1 22	98 20	18	225	73	90 3	254	5 57	25	16 7	3 15	46	162	68	92	3	255.	0 57	38	13 7	5,1	2 62	149	79	91.8	250	5.1	68.9	15 1	4.54	13	.44			92	
	1 65 3					73	90 1	254	3 57	22	15 0	8,14	02	142	69	93	1	255	4 37	47	10 8	0	9 77	150	79	90.8		5 5	69 6	15 1	0.95	110	91		70	91	
255	7 65 4	1 17	26 15	63	232	73		254										255	6 37	32	7.3	a '	0 90	149	10	184.6	1			Т							
255	9 65	8 16	00 14	41	233	74		254																			1										
256	3 65 6	0 14	34 12	79	233	74	89 4																				U					ı	- 1				
	5 65 6						90 3			- 1												1				1	1			П							
256	8 65.6	9 10	35 9	33	229	74	90 3		1																					П							
845	2 139	5 43	48 41	.16	78	73	94.8	544	2 122	4.3	6 P	5 36	11	178	70	97	7 3	43	2 12	2 2	38 5	9 30	6 06	204	77	93.4	541	8	145,	03	9 64	39	37			99 :	
546	9 139	9 40	51 37	.78	207	70	93 0	545	0 123	63	4 6	1 33	. 10	184	70	95.	6	543	K 12	2 4 3	35 3	8 3	3 04	215	77	92 4										96	
	8 140.					70	93 2	546	7 122	0.3	2 0	9,30	14	188	70	93	9 3	144	8 12	2 6	33 1	2 34	0 03	219	77	90.7	545	7	146.	92	5 25	24	ak			95 :	
	8 140					70	92 3	548 549	4 123	4 2	8 9	0 27	15	187	70	913	9 3	145	8 12	N	29.8	2 2	02	221	77	90 6 95 8		3	147	6 13	5 75	17	72		67	94 :	
	B 140							349																		SA 9		П		i.			Ĩ		- 7		
	1 141.																									89 4		Ц		ı							
8.10	§ 219	8 66	43 64	86	78	69	97.6	873	5 196	.54	9 3	5 48	14	265	66	97.	5 8	666	0 19	8	19 9	5 47	7 72	215		95.1										99	
864	5 221.	1 62	89 59	.71 2	201	70	94 9	875	0 196	94	4 5	0 43	30	286	65	97	3 8	168	2 19	3	15 6	8 42	2 98	223	77	94 1	878	6	236	6 4:	2 00	40	22			95	
	0 222																									92.7		1	238	2 3	9 40	28	58	132	19	94 (
	0 224																						8 600			90 8											
BB2	0 225	B 42	29 38	36 2	233	70	90 A		1	1	- "	1	3,	- 1	20	1							73			89 7											

Table 1, Above, Efficiency Test of No 2 Worm Gears When on Direct Speedi Table 2, Below, Worms and Wheela and Bevel Gears, Average Efficiencies Taken.

THE MORRIS "LOW DOWN" TRACTOR.

TO JUSTIFY the cost of labor-saving machinery it must be operated as nearly continuously as is possible, or it must be so large an economy that the saving by its use for a comparatively brief period will impel its purchase. Machinery is usually built for service, and purchasing is generally a business proposition. This application may be made with reference to agricultural equipment, and it may be stated that where farms are of considerable proportions large economies have been realized through the planting and harvesting of crops. While the time actually in service may be comparatively brief, the periods are restricted by the seasons and productive work must necessarily be netformed within them.

Work of this character must be expedited from every point of view and labor that can be applied with

the least diminished result is decidedly the most profitable. Those operating large farms have utilized differing forms of machinery, power being approved because of its greater capacity when contrasted with the work of animals. Farming operations on small areas may show material profit, but it is with farm work on a large scale that machines yield the greatest economy.

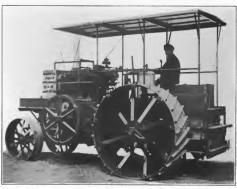
Manufacturers of farming machinery have within recent years developed power equipment with extreme care. The perfection of the gasoline engine has made this prime mover the most approved power source of the day. The tractor has replaced animals to a certain extent because of its large capacity for baulage, and while its limitations because of surface conditions are manifolders.

fold, it is entirely practical to utilize it for other work that extends its period of usefulness over a considerable portion of the year.

There is no question, however, that the tractor adjusted for farming requirements may be utilized in certain forms of construction, and particularly in high-way building, and it is not at all unreasonable to assume that it will, with adaptation for road work, be used for hauling heavy loads on the road.

The Morris "Low Down" tractor, built by George W. Morris, Racine, Wisa, is a development in road and farm tractors that has many qualities that recommend it, these including sufficient speed, large power, sturdy construction and a design that permits of its being used for many purposes. It may be used for plowing and other work in planting, for badding farm wagous or other forms of trailers, and it can be used quite as well on rough and uneven ground as on the roads. It is also practicable to use it as a portable engine for such work as power may be employed. The tractor is designed by Mr. Morris, who was for six years superintendent of the J. I. Case Threshing Machine Company's plant at Racine, and previous to that time was connected with the company for a considerable period.

The "Low Down" incorporated with the name does not well serve the intent of the designer, who sought to establish the fact that the tractor has a comparative by low centre of gravity, a quality that insures a more satisfactory result on rough roads and fields. This reduction of the centre of gravity is secured by mounting



Left Side of Morels Tractor, Illustracing Forward Suspension and the Belt Pulley Utilized When Serving as a Power Plant.

the rear axle above the frame and carrying the chassis on helical springs, while the forward end is supported on similar springs contained in pistons. The tractor frame and the motor and system for transmitting the power are extremely strong and surprisingly simple, while the wheels have been made as light as appears practicable. These are a truss form with long hubs and wide wheel surfaces, the rear wheel rims or faces being fitted with diagonal clears to afford traction in soft or shifting surfaces.

The tractor is driven by a four-cylinder, four-cycle, water-cooled vertical motor of the T-head type installed transversely in the classis frame, and through gears the power is transmitted to the traction whe is. There is a gearset incorporated in the driving system

so that there are two forward and a reverse speed ratios, and these are controlled by levers. As the motor is a slow duty type it is expected that it will produce the maximum power at 400 revolutions a minute for the largest sizes. The tractors are built with three sizes of engine-eight-inch bore and 12-inch stroke; seven-inch bore and 12-inch stroke, and 6,5-inch bore and 10-inch stroke. The ratings of these machines by the S. A. E. formula would be respectively 106.4, 78.4 and 67.6 horsepower, on the basis of 1000 feet piston travel a minute, but while considerably less than these figures is developed in actual power production there is no doubt that the motors will develop sufficient energy for all purposes. In fact there is a very large excess over normal requirements. The following description applies to the largest sized motor, but the other details are practically the same for all trailers.

The motor cylinders are cast in pairs and of a fine

length, with the end bearings the same diameter and extreme length, these being supported by webs at the ends of the crankcase. The crankpins are 3.75 inches diameter and four inches length. The main bearings are a fine quality of anti-friction metal. The connecting rods are steel drop forgings with the big ends fitted with bronze cages containing bearings of a fine quality of metal, these being retained by bolts, lock nuts and cotter pins. The small ends are fitted with phosphor bronze bearings pressed into the eyes in the rods by hydraulic pressure. The wristpins are of hardened tool steel and are secured by set screws. The camshafts are of special steel, are carried on three bearings of large size and are driven by gears from the erankshaft. The eams are hardened and ground and are adjustable by conical fittings, clamp retained.

The valves are large, with gray iron heads into which the stems are screwed and secured by shrinking.

The lower ends of the stems are fitted with means of adjustment for wear. The tappet rods are steel, carefully ground, and the yokes at the bases earry hardened steel rollers that engage with the faces of the cams, eliminating all side thrust. The Inbrigation is by a rotary gear driven pump that forces oil from the reservoir in the engine base and ejects streams of lubricant on the main and crankpin bearings, the centrifugal movement of the cranks throwing off the oil that is necessary to lubricate the timing gears, cams, tappets, connecting rods and wristpin bearings (oil ledges within the pistons insuring a sufficiency of oil for the bearings), and the piston and cylinder walls. The quantity of oil

is indicated by a sight gauge.



llight Side of the Morris Tractor, Showing Flywheel Containing Friction Clutch by Which the Machine is Driven.

quality of gray iron, with minisually large water jackets that are self-draining when the drain cock in the delivery pipe from the circulating pump is opened. The cylinder heads are bolted to the cylinder units, asbestos copper gaskets making a right contact of the members. There is a circulation of water through the centre of the cylinder heads. The engine base is a semi-steel casting of unusual strength, this being divided by two central webs which serve as a base for the centre main bearing, and it is in two sections, the upper and the lower. The lower section carries the flange, by which the motor is installed in the tractor chassis. The pistons are of a fine gray iron, are of unusual length, and are fitted with three rings above the wristpin and one below.

The crankshaft is a nickel steel forging with the middle bearing 4.5 inches diameter and five inches The motor is cooled by water that is circulated through the water jackets by a rotary pump of large capacity and the water is cooled in a radiator that it is claimed will not freeze, mounted forward of the motor. This system is maintained to be adequate at all times.

The carburction of the fuel is ingeniously provided, as it is intended that this motor shall be driven by gasoline, kerosene, naphtha or distillate. With kerosene two fuel tanks are necessary, one of 60 gallons for the kerosene and one of 20 gallons for the gasoline. The motor is first started with gasoline and then that fuel is shut off and the other used. The carburctor is Mr. Morris' invention. In it the kerosene is vaporized by heat and mixed with a sufficient volume of vapor of water to insure combustion and prevent carbonization. The carburction is maintained to be very ejection.

ficient and to afford a uniform and satisfactory mixture. The burned gases are exhausted into a very efficient muftler.

The ignition is by a low-tension magneto and a transformer coil, with a battery for starting and as a reserve. The operation of starting is to turn the engine one revolution with a starting crask to insure compression, after which it is fired by pressing a button. After the engine has been warmed the fuel is changed and with the change water is admitted to the intake manifold to insure the carburetion of the heavier oil.

The crankshaft projects at either side and at the right is a flywheel, and on the outboard end of the shaft is a belt pulley that is driven by a friction clutch acting on the inner periphery of the rim. When the machine is used for power production the drive is by a belt off this pulley, and this clutch may be disengaged so that the engine may continue to run but the power be not utilized. On the left end of the shaft is another

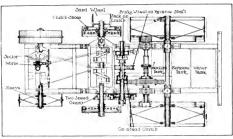
flywheel. Sliding on this shaft is a sleeve connected with a friction clutch that acts on the inner periphery of the flywheel. On this sleeve is a spur gear of two different diameters, Parallel with the engine shaft, transversely in the chassis, is a countershaft. On the right end of this are two pinions, the teeth of which mesh with those of the gear on the sleeve of the crankshaft. These pinions are idle on the shaft. Between them is a sliding clutch on a sleeve that moves on a squared end of the shaft. As the chutch between them is in neutral it may be changed from high to Plan View of the Morris Tractor with low by moving a lever.

The countershaft carries a loose pinion that may be fixed by a sliding clutch, and a similar clutch that is made operative through a lay shaft beneath it and by which the reverse movement of the tractor is obtained. When the driving pinion is fixed this operates a large gear on a second shaft. In this gear is incorporated the differential. On the ends of this shaft are pinions that mesh with the gears carried on the tractor wheels and by which the power of the engine is exerted. The friction clutch in the flywheel has shoes of wood, which may be renewed by a man without a knowledge of mechanics. The clutch may be engaged easily and the power exerted so as to move the tractor with great exactness. There is a brake on the countershaft by which the machine may be controlled.

The control is by a hand wheel and levers, the tractor being steered with a worm and sector. The from of the frame carrying the engine and its auxiliaries is carried on springs and the jars and jobts of ordinary movement are practically nullified. The relation of the front axle is maintained by radius rods that are pivotally attached to a cross member of the frame.

As may be noted from the illustrations the frame is dropped back of the forward wheels and on this, to clear the rear axle, a platform is built. On this is placed a tank, a chest for tools, supplies, etc., and on it the engineer stands and operates the machine. The floor is removable to afford access to the mechanism below it. The tractor is fitted with stanchions for spreading a canopy that covers it from the front of the motor to the back. Ahead of the canopy is the radiator and the exhaust stack, the latter being straight into the air.

Great care was taken in designing the tractor to insure sufficient strength and to secure wearing qualities. The wearing parts are all provided with means for abundant lubrication, and with the wheels, gears, pinions and moving members the oil chambers are such as to insure against lack of lubricant even when practically the minimum of attention is given to this matter.



Plan View of the Morris Tractor with Sectional Illustration of the Method of Driving the Machine.

The tractors have a maximum speed of about four miles an hour and can draw very large loads with trailers or can be utilized for plowing, and other forms of cultivation. They have in trials drawn eight 14-inch gang plows, turning alfalfa sod to a depth of seven inches. When the ground on which work to be done is soft the width of the traction wheels can be considerably increased.

Besides farm work these machines have been and are adapted for use for driving threshing machines, saw mills, shingle mills, pumping machinery, road graders, stone crushers, and for purposes where it is desirable that the power be sufficient and yet easily transported.

In order to meet heavy demands in 1913 for both its pleasure and commercial lines, the Michigan Buggy Company, Kalamazoo, Mich., has found it necessary to further enlarge its factory. Ground is being broken for the erection of a building which will provide 50,000 additional feet of floor space.

ELECTRIC TRUCKS AT NEW YORK DISPLAY.

THE Electrical Exposition and Automobile Show of 1912, conducted by the Electrical Show Company, which was inaugurated at Grand Central Palace, New York City, the evening of Oct. 9, and was concluded Oct. 19, was in every way successful and productive of good results. The exhibition attracted a very large attendance each day and there was unusual interest manifested. First of all the show was unusual in that it had as features an extremely large number of exhibits from departments of the national government, each of which was well worth the attention of the visitors, and these were supplemented by an excellent department devoted to the display and the demonstration of electric vehicles, to say nothing of many scientific, industrial and economic exhibits, in all of which the value of the use of electric energy was shown.

Grand Central Palace, where the exhibition took place, is designed for large public displays of this character, and the



George Fox Parker, Manager of the New York Electrical Exposition.

est and most comprehensive of the series.

mammoth apartments were made n n u snally attractive by decorations in which electric Lights were the principal feature. The exterior of the building was illuminated at night with elever and striking designs of gleaming lamps. The exhibition was the sixth held in New York, the first being held in 1907 in Madison Sonare Garden, and it was decidedly the larg-

There was additional interest given the show from the fact that its opening was an observance of the 30th anniversary of the starting of the first central station in the world by Thomas A. Edison, and it was significant in that it demonstrated the progression made during 30 years in the utilization of electric current. Not only this, the exposition was formally opened by Thomas A. Edison, whose inventions, more than of any other man, have made possible the use of a mysterioris force for lighting, power and heating. In fact there appears to be little realization by the people of the world of the debt they owe to the master mind of the man long known as the "Wizard of Menlo Park".

But prior to the opening of the show there was a tribute paid to Edison at a complimentary luncheon tendered to him by the New York Edison Company, at which was present a company of about 400 men. among whom were some of the leading scientists. financiers, manufacturers and professional men of New York and vicinity. The gathering was noteworthy in that those present were men of potent influence in the community, state, nation and the world's industrial, commercial and scientific life, all of whom understood what a marvellous development has resulted from the little station in Pearl street, New York, established by Edison three decades before. It was Edison who placed at the disposal of mankind the wonderful forces of electricity. Among those present were men who had witnessed day by day the increased utilization of electric power, and there was review of the activities of the company which has been regarded as first in electrical progression throughout the world. The luncheon was served in the banquet hall and it was followed by the formal opening of the show by Mr. Edison.

Of course, the real feature of the decorations were the lights. These were used in every conceivable manner and as a spectacle the show was especially interesting. In all there were 118 exhibitors, whose displays were arranged on the main and balcony floors, while on the second baleony floor was the demonstration track for electric vehicles. The national government co-operated with the management of the exhibition to the extent of showing some displays that were of peculiar interest. These included examples and apparatus used in medical research by the Department of Agriculture, an exhibit by the census bureau of the Department of Commerce and Labor, others by the bureau of mines and the reclamation service of the Department of the Interior, the Smithsonian Institute, the Navy Department, the War Department, the Isthmian Canal Commission, and by New York State. It is needless to say that these had great attraction for the visitors, especially the model of the great Gatun dam of the Panama Canal and the naval wireless telegraphy installation.

The show from the viewpoint of those interested in electric vehicles was admirable, and while these were not shown in a department devoted exclusively to them they were all seen on the main floor, the pleasure ears and service wagons being arranged to best meet the desires of the exhibitors. Because of limited space and the fact that it was believed wise to develop as widespread interest as was possible some of the exhibitors displayed both carriages and wagons, but it is interesting to note that of the 12 firms represented but four showed pleasure vehicles, while all but two had at least one model of wagon or truck.

The fact that nine of the exhibitors had displays at Boston may have necessitated dividing the show vehicles between the two, and this may have somewhat limited the number shown, but nevertheless the department was decidedly representative. In all 35 machines were displayed, of which 13 were pleasure types and 22 were for service purposes. The industrial ways ons ranged from the light runabout with special equipment to the five-ton truck, but the majority ranged from 1000 pounds to two tons, these being the capacities that are especially desirable for small business houses and those who require comparatively quick delivery. In addition to these were shown several industrial trucks intended for use in handling shop and factory products, freight, and the like, these being driven by electric power and having capacities ranging to 3000 pounds.

Of course the vehicles were the latest types and represented the highest quality produced by the makers, and aside from one loaned by the owner all were new. Naturally those with hody equipment were admirably finished and intended to attract attention because of appearance wherever seen. There were no restrictions upon the movement of vehicles in the building and the visitors found much to interest them on the second balcony floor, where a demonstration track, 20 feet in width and 528 feet to the circuit, had been laid out. This was used for demonstrating purposes and here any person who desired could have the machines set apart for trials practically shown to them.

ment that it decided on the more elaborate facilities, for demonstration employed at the show just closed. The indoor trials of machines, apart from traffic and confusion, cannot be too highly valued. But it should be understood that the buyers of service equipment demand considerable periods for observation and are not inclined to be guided by the mere handling of the machine. A number of the exhibitors kept vehicles in the enclosure within the track and these were shown as often as desired.

The exhibitors of vehicles were as follows:

Anderson Electric Car Company, Detroit, Mich, showed a twe-ton Detroit Electric wagon on the demonstration track and three chassis of 1000, 2000 and 3000 pounds capacity, as well as a roadster, coupe, brougham, victoria and limonsine at the stand. These were all the latest productions and the brougham was shown for the first time.

Atlantic Vehicle Company, Newark, N. J., displayed on the track a 3.5-ton Atlantic truck chassis, this being next to the largest size of the standard design vehicles produced by this concern. At the stand was exhibited a one-ton wagon classis, this being the



Some of the Service Wagons That Were Shown to Investigators in Actual Operation-Photo by Photographic Bureau, New York Edlson Company.

This section of the show was under the direction of the Electric Vehicle Association of America, representatives of the New York branch being present during the show for the purpose of informing all who wished facts concerning any machine or of its service or operation. For the benefit of the women visitors Mrs. Alice E. Waxham, who is a professional instructor in electric carriage driving, was in attendance to give information and expert assistance to all who wished to obtain experience preparatory to handling machines. The track was defined by a hedge at either side, and within the park was a small charging equipment with capacity for four batteries at a time, this being used to charge the batteries and to illustrate the installation that would be necessary in a modest private garage, or a part of what would be needed in a station for a delivery service or public station. With opportunity for observation and with all data available at inquiry this division of the show served a specially useful purpose.

At the show last year a similar track was used with admirable results, and so satisfied was the managesmallest machine that has yet been produced.

Baker Motor Vehicle Company, Cleveland, O., showed two Baker service vehicles, the one being the bevel gear shart driven runabout of \$50 pounds capacity, a machine that has been produced for about two months, and a two-ton chassis, this being the standard type that has been delivered very largely to express companies. The display of pleasure cars included a wheel steered brougham, a coupe and a victoria.

S. R. Bailey & Son, Inc., Amesbury, Mass., exhibited a single model, this being a Bailey roadster especially designed for quick service, it baving a speed of 20 miles an hour and a carrying capacity of 500 pounds. Machines of this type have been driven 80 miles in four hours.

Champion Electric Vehicle Company, Oswego, N. Y. Showed two service models, the one being a machine of 1000 pounds capacity, driven by shaft, and the other a one-ton wagon with double chain reduction. The former is claimed to be from 800 to 750 pounds lighter in weight than many standard types of like

capacity. In this model the battery is under the seat and the steering column, with control lever beneath the wheel, is at the left side. The front axle is I section and the rear axle housing is pressed steel and the chassis frame is a stout channel section. The mileage is rated at 50 to the charge.

Cleveland-Galion Motor Truck Company, Cleveland, O., exhibited several of the dynamic industrial trucks, intended for use in railroad or steamship terminals, warehouses, mills, factories, etc., which have one-ton capacity. These trucks are driven by and steered with all four wheels and may be even driven sideways, which facilitates quick handling of material transported.

Buffalo Electric Vehicle Company, Buffalo, N. V., made display of three pleasure cars, one a runabout and the other two coute types. This contern is preparing to place in the market a complete line of service wagons, but no model is ready for demonstration as vet.

General Motors Truck Company, Pontiac, Mich., showed a five-ton G-M-C chassis with the wheels chine is carried on the wagon. It is driven to the brewery or bottling establishment and there the machine is operated by current drawn from the vehicle battery. The 3,5-ton chassis is fitted with a tank and may be used for spraying highways with oil or water. The tank may be filled and the contents distributed uniformly and economically over a given area of highway, a 1,5 horsepower motor driven by the battery affording the necessary pressure in the tank to give the required feed. If needed for other purposes the tank may be removed and a body installed.

Studebaker Corporation, South Bend, Ind., had for exhibition a 1000-pound Studebaker ehassis equipped with a panel delivery body, a two-ton 1913 chassis fitted with a stake platform body, and a five-ton wagon loaned by George Ehret on which was a body designed for brewery delivery by Louis Ehret.

Ward Motor Vehicle Company, New York City, exhibited two Ward machines, the one being a 1000pound delivery wagon and the other a one-ton wagon, the first built for the delivery of bread, and the other designed for the general service of the Edison Elec-



Several of the Pleasure Cars Awaiting to Enter the Demonstrating Track-Photo by Photographic Bureau, New York Edison Company,

jacked from the floor that the method of control could be the more easily demonstrated. This is the largest electric machine yet produced by this concern, and it was the first of this size ever shown in the East.

General Vehicle Company, Long Island City, N. Y. exhibited at its stand a 3-5-ton GeV truck built for Arnold, Constable & Co., and a 1000-pound panel body wagon built for Black, Star & Frost, the former being an addition to a flect of 14 General Vehicle wagons and the latter one of three ordered recently. An industrial truck of one-cton capacity was also displayed, while on the track were demonstrated two 750-pound wagons.

Lansder Company, Newark, N. J., showed a onetion chassis that represented the latest Lansden perfections, including the numerous qualities that were described in the last issue of MOTOR TRUCK. The two-ton chassis is fitted with two forms of body equipment, the one being the ordinary express type. The other is adapted to demonstrating a machine for crowning or capping beer bottles, which matric Illuminating Company of Brooklyn, N. Y.

Edison Storage Battery Company, Orange, N. J., made display of Edison batteries intended for railroad lighting, vehicle propulsion, and motor car ignition and lighting, as well as parts that compose Edison battery cells, and a direct connected General Electric charging outfit, an Edison alternating current rectifier and two coltage regulators.

Electric Storage Battery Company, Philadelphia, Penn., showed a comprehensive display of storage battery cells suited for lighting, vehicles, ignition and motor car lighting, and for use by central stations, and the latest type of end cell switch. Some forms of earlier construction were also shown.

Philadelphia Storage Battery Company, Philadelphia, Penn., exhibited the different sizes of battery cells it produces, showing the remarkable progress that has been made in lessening weight and increasing efficiency by a series of cells that were developed from time to time.

Gould Storage Battery Company, New York City, made exhibition of the different forms of storage bat-



Exra Meeker of Scattle, Wash, Touring the Country in Prairie Schooner of 1864.

teries it manufactures, these including ignition, motor car lighting, vehicle propulsion, house lighting, aswell as components for batteries for submarine vessels and for central stations.

OXEN VS. ELECTRIC TRUCKS.

Famous Pioneer Discusses Relative Merits and Demonstrates That He Understands Both.

In 1864, Ezra Meeker, now of Seattle, Wash,, crossed the plains in a prairie schooner drawn by a voke of oxen. Of late he has been engaged in reviv-

ing interest in the relocation of the old Oregon trail, having started from Seattle in 1906, with his original prairie schooner, shown herewith. During the past six years he has driven oxen some 8000 miles, crossing and recrossing the omntry in what he calls an advertising scheme, purely and simply.

That this famous pioneer is interested in progressive means of transportation was indicated during his recent visit to Denver, Cod., where the second picture was taken. Not only is he interested, but he is familiar with the modern electric vehicle, as is evident from the fact that he drove the G. V. wagon, owned and operated by the Denver Gas & Electric Light Company about the streets of Denver for some time during his stay in that city. He discusses the situation as follows:

"How easy pioneering would have been in old days if we had had the horseless system of transportation. I remember when the hading in Denver and other pioneer towns was done mostly by oxen, and in those days we used to think we did a business of some volume. I am an old man with wide experience, and I think my judgment is worth something, so when I predict that the electric will eventually be the popular machine I am not talking through my hat, as the saying

"Just take, for instance, the price of gasoline. I see it has gone up. And isn't it going up more? Won't that make the business men think about the electric? Ont in 'Frisco one of the electric fellows told me something about its cost. He told me how economical.

they were. It certainly stands to reason that an electric delivery system should be cheaper than any other. When you stop at a house your expense stops. There is no engine to keep going.

"Why, you may not believe it, but I myself know how to run one of your trucks. Do you know how long it took me to get the hang of the thing! Just half an hour. Now it books to me that any common teamster could learn to run one of those machines in no time."

It was at the conclusion of this little speech that Mr. Meeker was invited to show his driving ability, and his picture was taken at the wheel of the G.V.



Exra Mecker at the Wheel of G. V. Electric Wagon in Denver, Col.

BOSTON ELECTRIC SHOW A SPLENDID SUCCESS.

THE exhibition of electric vehicles in connection with the 1912 Boston Electric Show was exceedingly creditable. In fact it is certain that it was the largest display of such machines ever made at any one time in America and perhaps in the world, and while it was representative in every way it did not indicate the enormous progression made by the industry so far as number of manufacturers is concerned. This was due to many reasons, clief of which is the unwillingness of many makers to engage in what may be termed promotion of the use of delectric machines.

Relative to this aspect of the market it may be stated that there are many firms producing electrics whose officers believe it is ill advised to co-operate in the campaign of promotion imagurated by the Electric Vehicle Association of America as their factories are limited as to production, the outputs can be disposed of without difficulty in comparatively small areas and without extraordinary selling expense, and

they are content for the time being with the business in prospect without endeavoring to stimulate a general knowledge of the economy of electric transportation.

This condition was realized by Day

This condition was realized by Day Baker, now treasurer of the Electric Vehicle Association of America, who visited a number of the manufacturers of the country during his vacation in an endeavor to create



Chester L Campbell, Manager 1912 Boston Electric Show.

interest in the Boston show, and it was also experienced by W. H. Blood, Jr., who, as president of the Electric Vehicle Association of America, solicited contributions to the publicity campaign find of the association. This statement is made for the purpose of showing that the firms that made exhibition did so largely from a viewpoint of co-operation with the central stations and to demonstrate the possibilities of the vehicles.

There is no doubt that the hundreds of thousands who visited the show were much impressed with the electric motor vehicles. It is not to be assumed that the visitors were all interested in the machines, but without question thousands who knew little or nothing of the capacities of the cars and tracks found much general and specific information, and those who have animal delivery equipment and are investigating transportation had available data that could not have been otherwise obtained save by the devotion of so much time that inquiry might not have been undertaken by extremely busy men.

The departmentalizing of the electric vehicles was natural enough in that it impressed upon the visitors the character and quality of the different exhibits, and afforded opportunity for comparisons which developed understanding and appreciation of the various types. So far as the pleasure cars were concerned there is no doubt that the excellence and elegance of these machines appealed to a very large class, for these are especially adapted to the requirements of city and suburban residents, and are so economical and enduring that for service in town and suburb they can be commended by all motorists. The service vehicles, however, interested those who have to consider all forms of highway transportation, and as these were practically of every type, from the 750-pound delivery wagon to the heavy truck, the logical machines for many forms of work were available for close examination and inquiry.

It may be stated that the length of the show from the viewpoint of the exhibitors was such that they could not give their entire time and attention to developing its possibilities, because of the demands of regular business, but as considered by the visitors it was decidedly advantageous as they could devote whatever time they desired, and especially evenings, to collection of information of decided value to them. There are those who may believe that a person concerned in the comonic aspect of highway haulage can or will give whatever time is necessary to inquiry, but it will give whatever time is necessary to inquiry, but it into a paperent that where every desirable fact is available at times when business duties are forgotten an interested person would make the most of an opportunity.

In connection with the show of machines the results of standardization were decidedly impressed upon the visitors. To illustrate: With many of the makes shown aside from size of components the vehicles are identical in design and construction. The smallest machine is exactly the same as the largest, and in each chassis is precisely the same number of parts, so that what may be stated of one size applies equally well to the others of the same make. This does not hold true of all machines shown, but to practically all of those making several sizes, and further than this there is no disposition by the makers to make changes. In fact one of the strongest arguments made is the continuance of a design from year to year. with perhaps refinements as to controlling or regulating devices, and the fact that there are no radical differences in the most recent productions and those built a year or two previous. It must not be assumed there are no progressions in electric wagon design, but it will be understood that the majority of the principal makes are developments from years of practical use

and experiment, and are types that have been proven best adapted for general requirements.

As to the wagous as displayed it must be realized that these were but a very few of the possibilities so far as body equipment was concerned. While the chassis of a given maker may be identical in design. though they vary in size, the greatest difference may be made in appearance by the body installed. It is true that there may be uses in which the fine finish and handsome ornamentation of the show wagons would be superfluous and the cost could be reduced by dispensing with the decorating, but the majority of business men believe in making a consistent display with their delivery service, assuming that the prestige gained by making a good impression wherever the vehicles are seen is worth all the cost. This being so, the purpose of showing the advertising value of the wagons exhibited is obvious. Not only this, these machines emphasized to the visitors qualities that may have not previously been realized.

Many of the machines shown with body equipment

livery, and they found difficulty in gathering facts that they could logically apply to their own benefit. It was necessary to learn the conditions under which the particular business was conducted before it was possible to make suggestions, and to go into each inquiry sufficiently to establish a foundation for opinions was necessarily a lengthy process, and while this was imperative with many there is no question that the result was beneficial. This, of course, applies to service wagons only.

Another fact developed was that while there are moreons branches and agencies for machines in Boston the number in other sections of New England is comparatively few, and this was in a sense a limitation because the people from a distance do not regard with favor being dependent upon those whom they cannot reach as easily as they can the agents for other vehicles. By this is meant that a greater number of agents would better serve and more quickly interest people who favor electrics. In other words the activities of the agents are necessarily confined to the sections in-



1 Section of the Automobile Park That Was Given Over to Service Wagon Displays.

have been or are to be placed in service in different cities and towns, and some of these were striking in appearance and could not fail to attract attention wherever seen. Of course the character and quality of the bodies does not affect the serviceability of the wagons, but it is certain enough that many men propose to realize all the advertising as well as the service value that electric vehicles will afford, a combination that can be commended by any business man.

But if there was any one fact established it was the surprising lack of knowledge of the electric car and wagon. Men who are in business in distant cities and towns decoded themselves to gathering information they believed might be beneficial. In many instances they were from localities where as yet these machines are not used, and yet there is no reason why they could not be as economically utilized as in the larger commercial centres. Some inquirers stated frankly that they could not expect to receive from men in their own lines information that would make them still greater commetitors if they emblowed like dismediately contiguous to the cities in which they are located, and in the absence of representatives the people can not be expected to promote the use and sale of that with which they are unfamiliar.

A phase that was also worthy of attention was the supposition of many that an electric machine requires expert attendance. There is a belief very generally prevailing that the equipment for a privately maintained garage is costly and complicated, and that large experience is essential to afford desirable maintenance and care. The electric garage conducted in connection with the show was one of the best demonstrations that could be made that there is no foundation for such opinion, and that as a matter of fact the expense is comparatively small. Not only this, but when once equipped a station could be used with a very small expense for repair and upkeep for a long period. Further than this, it was shown that the tendency of the central stations is to reduce the cost of current and that with the greater production of energy and the increased consumption the price is invariably decreased wherever the conditions have warranted.

This was emphasized by the Edison Electric Illminiating Company of Boston which at the time of the opening of the show established a new rate for charging and power current, bringing it to three cents a kilowatt-hour after the first 20 hours? service, which will make the cost for a full charge for a five-ton truck SLI85, this giving considerably more than the rate capacity of 35 miles, half of the distance carrying full load. Based on rated mileage capacity this means about 3.5 cents a mile for current consumed. With smaller vehicles the rate is at least proportionately less on the basis of mileage and battery capacity.

The value of a garage as a demonstration of possibilities was apparent, for its equipment and the methods were carefully investigated by many who were desirous of ascertaining the service and the attention afforded. In this were garaged a considerable number of machines of all types and sizes, from the six-ton trucks of the Boston Edison Company to the runabouts of some of the exhibitors, and while the greater part of these were in daily service the garage was well filled at night and the night force was extremely busy as a rule. The visitors had opportunity for following and observing the work of any given machine for as long a period as was desired, and to make notes or obtain any information that was sought. In the ordinary garage facts and information pertaining to organization, efficiency or results are seldom available, and are never open to the public as a whole, and in this the ideal electric garage was one of the best, if not the best, exhibits of the show. To be sure the data were based on the proportions and the equipment, and it may be said that the smaller service station is relatively more costly, but there is no decrying the fact that it served a decidedly useful purpose, to say nothing of the demonstration of the methods that were desirable in well maintaining electric machines.

The garage was conducted by the Atlantic Avenue Electric Garage of Boston, and was under the management of E. S. Mansfield, who is manager of that establishment. The system of caring for the wagons and trucks was the same and the work was performed under the direction of the foremen and their assistants. This statement is made to emphasize that the methods were entirely practical and have been found satisfactory in constant station service, and are such as can be imitated or adapted by any other concern. It may be well to state that the Atlantic Avenue Electric Garage is the only exclusive station, separate and apart from a central station service, in New England, given over to industrial warons.

Viewed from any aspect the electric vehicle exhibition in connection with the 1912 Boston Electric Show was decidedly a success. There is no doubt whatever that it has been distinctly promotive of theuse of machines and has brought to the direct attention of hundreds of thousands the practical utility of electric convexances, as well as establishing conclusively the magnitude and importance of the industry. Another condition worthy of comment is that with the exhibitors there was a pronounced harmony, and each endeavored to impress upon visitors that a spirit of co-operation prevailed. There were numerous instances of salesmen and dealers turning interested inquirers to others, and with each it was a case of doing all that was possible and practical to promote the welfare of all.

There were several interesting exhibits shown that are deserving of special attention. One of these was the one-ton Lansden wagon that was delivered in 1994 to the Thomas A. Edison Company at Orange, N. J., and since that time has been in constant service. This wagon was driven from Orange to Boston by H. M. Wilson, and the current was supplied from a battery of 40 A-6 Edison cells which after 43 months' constant use in a department store service in New York was borrowed for the demonstration. The battery is one of the oldest of the Edison type in use and it was regarded as extremely efficient. On the returned to the owner and again placed in the service in which it has been used.

Another object of interest was the 1000-pound Studebaker delivery wagon that has been for 3.5 years in the delivery service of the Christian Science Monitor and used for the distribution of newspapers about Boston. During the period stated the machine has been driven between 25,000 and 30,000 miles. This vehicle, with a panel body, was displayed mounted on a two-ton wagon chassis.

The first G-M-C wagon chassis built was also exhibited, the machine evidencing the service given it. It is stated that this chassis was driven 10,000 miles in six months, making trips between Detroit and Pontiac, Alich, with two crews alternating to thoroughly test the construction.

The big machines were the five-ton truck chassis shown by the General Vehicle and the Atlantic Vebicle companies, that of the former being an order that was delivered directly after the show to the Massachusetts Breweigers, Inc., and which will be used for regular delivery. The Atlantic chassis is the demonstrator used by Charles D. Daly, who was famed as a quarterback for the Harvard and West Point football teams, and later fire commissioner of Boston, and who is now the representative of the company in Boston.

Some of the exhibitors that produce both pleasure and service machines showed but one type because of lack of space, and others were unable to procure a model of the service vehicles which they will in future distribute.

The show as a whole was exceedingly successful. The attendance averaged close to 40,000 daily, and it was estimated that approximately 1,000,000 persons visited the exhibition. There was abundant interest in the greatly diversified displays and there is no question that the result will be a very largely increased use of electric current in Boston and vicinity and the utilization of the innumerable devices and appliances that make for industrial and domestic economy.

The success of the display, when viewed as a



First Electric Truck Employed in Wholesaic Paper Hanlage-A 3.5-Ton Atlantic.

strictly business proposition, was due very largely to the fact that those in charge of the arrangements selected Chester I. Campbell as manager. The motoring public is well aware that Mr. Campbell has been manager of all the automobile, motor boat and aeroplane exhibitions in Boston, these being the largest and most successful displays of this character ever held. This explains the wonderful attention to detail which made the 1912 Boston Electric Show such a splendid success, although it by no means indicates the methods employed by Mr. Campbell. His study of this subject has been most thorough, and while the result seems simple of attainment when carried out by him, it would be difficult to secure the same management from other hands. That this is true is horne out by the fact that Mr. Campbell has been selected to head a committee of automobile show men engaged in carrying out a series of motor car exhibitions in the larger cities throughout the country this coming winter and spring.

ATLANTIC IN PAPER HAULAGE.

Eight of the Two-Ton Models Also Sold to the Adams Express Company in Philadelphia.

The policy adopted by the Atlantic Vehicle Company, Newark, N. L. maker of Atlantic electric vehicles, in which the engineering department volunteers to aid in the solution of haulage problems presented by those who are interested in installing the modern method of transportation, has been successful in opening up at least one new line of business endeavor to the electric vehicle. An accompanying illustration shows what is believed to be the first electric truck utilized in the wholesale paper business. This was purchased by the Maurice O'Meara Company, 448 Pearl street. New York City, after a thorough study of the question and a most careful investigation of the merits of

the Atlantic. It is a 3.5-ton vehicle and has given excellent satisfaction.

The other illustration herewith presents a two-tonmodel, recently sold to the Adams Express Company of Philadelphia. It is one of a fleet of eight trucks of the same capacity sold to this concern. That express companies have been convinced of the simplicity, reliability and efficiency of this type of vehicle is borne out by the large orders which have been given to several makers of electrics during the past few months,

MOTZ GAVE GOOD SERVICE.

Laundry Proprietor Finds They Wear Twice as Long as Pneumatics in That Work,

Commercial vehicles in constant service over rough streets and roads furnish a decidedly severe test on tires. A large number of truck owners who have been using Motz non-skid cushion tires have been writing the maker, the Motz Tire & Rubber Company, Akron, O., concerning their experiences. One of the letters follows:

We have run our car since June 3, 1911. We have no speedometer, but think the car has been run between 5000 and 6000

These Motz non-skid cushion tires are the only tires with which I have had any experience, but a faundry in Harrisonburg, Va., which purchased a car equipped with pneumatic tires the same day 1 purchased my car, has nearly worn out two sets. From the trouble 1 see others having with pneumatic tires, I think the Mota tires last more than twice as long as the pneumatle tires under the same working conditions

I prefer the Mutz non-skid cushlun thes, especially for de-livery service. We have had unusually load weather here-from, rough streets a good part of the Univ--and but for this I believe that my thes would yet be good for a long time. Only one on a rear wheel is practically gone. The other will be gone soon, but the front tires are very good. So I can say for your tires that I am well pleased with them

in every particular. (Signed)

proprietor Lexington Steam Laundry, Lexington, Va.

More Trucks in Boston-The Jenney Manufacturing Company, Boston, Mass., has accepted delivery of a five-ton General Vehicle truck which is to be used in the delivery of gasoline about Boston and vicinity,



Two-Ton Minntle Truck, One of a Picet of Eight Sold to Adams Express Company, Philadelphia.

the electric vehicle being held to be especially adapted for service of this character because of its immunity from danger. The D. J. Cutter Coal Company has also placed a five-ton General Vehicle truck in service.

WILLIAMS HEADS NATIONAL ASSOCIATION.

Convention at Boston Awakens Great Interest in a Body Already Having Great Industrial Influence—Practical Work to Promote a Market for Electric Vehicles and Current—Suggestions for Activities.

THE third annual convention of the Electric Vehicten, Mass, Oct. 89, was the largest and most profitable in the history of the organization. A majority of the members was represented and the proceedings were extremely interesting from every point of view. If there were comment it would be of the fact that there was not, in some instances, as much discussion as the excellence of some of the subjects presented deserved. This is not meant to imply that there was not keen interest, but there were so many possibilities for practical results arising from the suggestions and recommendations that endeavor should have been made to develop them without delay.

The arrangements for the convention were made by a committee of energetic workers and the pro-



Arthur Williams, New York Uity, President Electric Vehicle Association of America.

gramme was so planned that the delegates had one afternoon and one eventing of the two days to devote to pleasure and recreation. Many availed themselves of the privilege of visiting the 1912 Boston electric show as guests of the Edison Electric Illuminating Company of Boston, giving special attention to the department devoted to electric vehicles, electric vehicle equipment and electrical accessories. The afternoon of the first day the visiting members were entertained by the Electric Vehicle Club of Boston, which had arranged for the use of electric cars for runs to several country clubs, with privileges of golf links, visits to the historic points and to the Recolutionary battlefields of Concord and Lexington. The members were the guests of the Edison Electric Illuminating

Company of Boston at luncheon the second day, and in the evening the members and guests were entertained by the New England section of the Electric Vehicle Association of America at a theatre party.

About 150 were assembled in the convention hall when the assemblage was called to order by President W. H. Blood, Jr., who after welcoming the members formally spoke in part as follows:

Two years of selivity crowned with success proves conclusively that the formation of the Electric Vehicle. Association of America was a wise move. Lukewarm manufacturers have been turned into enhastastic bonoters for the association; conservative central station managers now fully appreciate the value of enougherative effort in introducing electric vehicles, and to use many associations, are now scrambling to get absord the electric band wagon.

the present invalue-rable of 325 indicates a growth in the pust year of 5 per cent, and those 35 members represent companies having a combined capital account of over Essamouses. A few years and electric whether were not inacely used and sidely manufacturers were not making large sales and their factory and selling counts were necessarily high. An few electric valides were being marketed, the battery manufacturers were comparatively high rates for electric current were highering rather than helping the introduction of electric valides. All of these first-rates as work at about the same time, joined handle of these first-rates as work at about the same time, joined handle

It is smallfying to note that this cooperative effort has brought about larger sales of electric velticles with corresponding reduction in overhead charges at the manufacturing plants. Reductions in electric rates have almost invariably followed where central stations have made studies of this new iond of chargina selectric vehicle batteries. The external stations have and failed to recomize the valuable feature at this offout adding to their residual accounts.

out solding to their capital accounts.

That the public is the ultimate salner from the use of electric vehicles is now fully realized—the results of operation prove it. The progressive merchant, brewer, prefect, express company and others are placing their orders not only for stagle wagons, but for dozen, scores, and, in fact, for entire

company and others are placing their orders not only for Schgle wagons, but for dozens, scores, and, in fact, for entire scheduling the school of the school of the school of the for to call it, still grows in popularity, and with its graceful lines, low centre of gravity and elekant furnishings it will continue to be as it is now—the real car de luxe. It is interesting to note that our friends, the gas car manu-

It is interesting to note that our friends, the gas car manufacturers, now advertise their self-stating cars to be "as simple as an electric," and some of them show with pride how far their cars will run on the electric starting motor with its storter of their cars. The starting motor with its storand substitute a forcer battery of the some one step further and substitute a forcer battery of the some one complete by the guseline engine, we have to ideal vehicle.

ance hattery. If we carry held adverthements one step further the gaustine entire, we have the ideal vehicle.

It is proper to call your attention to a comparison between the price of gas and of orientificity. Othis a few power are two the automobile industry started to cents a gain of severe the automobile industry started to cents a gain of was no ruling price. This price has constantly climbed to It, it, it is and a series of the control of the cont

The owner of the electric vehicle has no reif or the decaded hoof and mouth disease or of the new horse disease which has broken out with such vholence in Kamsas, where it has caused the death of 16,000 horses, or a property loss of over \$2,000,000. It is estimated that in New York State there are about 600,000 lorges. What if this disease should get of fast hold there? A loss of is per cent, of the total number of horses, which is entirely within the limit of possibility, would carry with it a monetary loss of at least \$12,000,000, to say nothing of the suffering to the animals themselves and the inconvenience and the collateral losses to the owners.

Some day, and that not far in the future, I predict that all Nome day, and that not far in the future, I preside unat an the dray horses in the large cities will be replaced by motor trucks. It would not be surprising if horses were legislated from the streets in the congested district within the next flow years. A shrinkage at an increased rate is almost inevitable, for the congestion of traffic in our large cities is one of our serious municipal problems. By the use of motor trucks the saying of time, the reduction of the street space occupied and the increase in the size of loads handled, the problem becomes much simplified and partially solved.

Electric vehicles are most dependable. Operating statistics show that electric vehicles are in service more days in the year than any other transportation device. That the increase in the number of electric vehicles installed during the past year is at least partially attributable to the activity of this associa-tion is attested by many manufacturers.

The committees of the association have all done good work, and I hardly need recite what each one has accomplished, for in their reports, which will be read shortly, they will render an account of themselves. Recommendation is made, on account the increasing duties of the secretary's office and the desire of some of our members that the scope of the office be broad-ened, that a permanent secretary be employed by the associaend, that a permanent secretary be employed by the associa-tion of the secretary between the secretary between the secretary recommend, if I can be financed by the association as our whole and not by a few of its prominent members. Furths the past over the New Finaland section of this association has been secretary between the secretary of the secretary of the Station Association, which furnished the idea and formed the nucleus of the Electric Vehicle Association of Americo. There was also formed late in the spring a Chicago branch of the Electric Vehicle Association of America. This branch is rapidly increasing its membership and adds strength to the parent association. It is hoped that similar branches may be formed association. It is noped that seminal equations are in a line some of the other large cities. The cooperative idea of the association should be uppermost in our minds, for by working together we can best promote the use and adoption of the electric vehicle.

The report of the membership committee stated that Sept. 1 the association had a membership of 317, a gain of 120 as compared with the report of Oct. 10, 1911, the list including 83 active members, 222 associate members, seven auxiliary members and five press members, there being included among the members 17 electric vehicle manufacturers, 56 central stations and 10 accessory manufacturers. The geographical location showed 228 to be in the Atlantic Slope and Gulf States, including nine electric vehicle manufacturers and 32 central stations; 72 in the Middle States, including eight electric vehicle manufacturers and 13 central stations, and 17 west of the Mississippi river, including nine central stations. The association has two active branches, the New England section and at Chicago. The committee advised the engagement of a permanent secretary, and that one of the first of his duties be the establishment of branches of the association throughout the country, it being believed that the office could be in part, if not wholly, supported by an official organ.

The report of the emblem committee was to the effect that an association emblem had been selected and appeared on the stationary of the organization and a lapel button.

The report of the committee on insurance was submitted by Day Baker, chairman, and it was of extreme interest. An abstract of the report follows:

Report of the Committee on Insurance.

The committee on Insurance, of the Electric Vehicle Association of America, by its efforts in collecting data as to experience with respect to accidents involving injuries to person and damage to the property of others in connection with the operation of electric trucks, also experience as to fire base on same, has secured from the companies writing liability insurance a differential of 10 per cent. In the rates for the United States and Canada on all electric commercial vehicles. has also been secured a reduction in the fire insurance rates of all electric vehicles, both commercial and pleasure, of 25 cents a hundred of insurance. By climinating the theft and valued policy feature from the fire insurance the differential is increased to 50 cents.

With respect to fire insurance on electric vehicles these have for some time here receiving lower rates of premium. Prior to June, 1912, rates for the usual valued form of floater policy on automobiles have been as follows, for cars of the cur-rent year's model. Gasoline machines, 2.25 per cent to 2.75 per cent; electric machines, 2 per cent, and for older models: (lasoline machines, 2.25 per cent, to 4 per cent, taccording to list price of car and amount of insurance), electric machines, 2 cent.

For exclusion of the valued feature a discount of .25 per cent, had been allowed on gasoline machines, and for exclu-sion of both valued feature and theft hazard, a discount of per cent. The minimum rate, however, in any event was fixed at 2 per cent. This minimum rate applied also to electric ma-

valued feature and theft hazard.

From the above you will see that prior to June, 1912, there was a differential in favor of electric machines of at least 25 cents, and this lower rate included theft hasard and valued feature. Some gasoline machines of current year's model could feature written at a 2 per cent, rate by eliminating the valued fea-re. The differential on electrics as compared with gasoline cars on older models was much greater, ranging from 25 cents to as likh as \$2. In June, 1912, the rate on electric machines was reduced to \$1.75 for policies including the theft hazard and was reduced to 11.75 for policies including the theft hastaf and value feature, and a further reduction of 25 cents allowed for elimination of these two features. The fire insurance rate for electric automobiles is therefore now for all models \$1.75, and for non-valued, excluding theft form, \$1.50, With respect to rates for liability insurance there has for

several years been a differential rate for electric pleasure cars. Outside of certain differential territory, such as New York City. Boston, Chicago, etc., which take a higher rate on all classes of automobiles, Hability Insurance rates for electries have been: \$20 a year for Hability covering personal injuries or death, and \$1.50 a year for Hability for damage to the property of others. The rates for the lowest rated gasoline cars have been \$25 for the liability, and \$10 for the property damage, and of others the rates on gasoline cars increased in proportion to the horse power.

noted in the differential territory, such as New York City, Hos-ton, Chicago, etc., the rate for electric pleasure vehicles has also been proportionately lower than for the gasoline cars. Prior to June, 1912, there had not been a differential rate for liability insurance on electric commercial vehicles. In June, 1912, a 10 per cent. differential rate was made for electric mercial vehicles, this differential applying to the entire

While it is true that in June, 1912, the companies made a re-classification of commercial cars, which in some instances in-creased the rate on certain classes, 800 the re-classification resuited in a lower rate on more classes of cars than it did in an increased inte. As a matter of fact there was a prior At that time classification of commercial cars in July, 1911. At that time while there was a change in the classification of some types of commercial cars which increased the rates, there was a reduc-tion in rate of from \$10 to \$25 on most classes, but no dif-ferential was then made for electrics.

On class of cars upon which the rate was increased in July, 1911, was "construction and repair cars of electric light and power companies, telephone and telegraph and street railway companies. This classification, however, does not refer to the ordinary commercial trucks used in the business of these comjoinles, but simply to the "hurry-up" wagons and line repair-ing wagons used in construction and repair work. This class of wagons was at that lime placed in the highest rated class.

At the same time trucks used by brewers, parcel delivery concerns and general truckmen were taken from the highest classification and reduced to a lower classification. In the reclassification of June, 1912, the only classes of commercial vehicles upon which the rates were increased by the change in classification were as follows. Harret and box makers and dealers, builed dealers, builed material merchants, carpenters, cleaners and dyers, coal dealers, contract-ors, feed and grain dealers, fire patrol and salvage corps autoand water furniture moving, gas matns. dealers, junk and scrap from dealers, faundries, lumber dealers and manufacturers, machinery dealers, masons' materials, oil distributing companies, plano movers and dealers, police patrol

automobiles, railway iron, structural iron and steel.

I'pon the following classes the rates remain the same: Ambulances, longgage transfer, bottlers, brewers, department stores, dry goods stores (retail), electric light companies (construction and repair cars), telephone and telegraph (construc-tion and repair cars), street railway companies (construction and repair cars), express companies, liquor dealers, mall wagons, news companies, newspaper delivery, parcel delivery, safe movers and manufacturers, truckmen.

on all other classes of commercial trucks there was a reduction in rate on gasoline cars, and it will be noted that cars used by nearly all wholesale and retail stores and manufacturing plants would receive this reduction in rate. In addition there is a further 10 per cent. differential on all electric comin addition This reclassification and the differential rate on electrica apply to the entire country.

The report of the committee on the establishment of a course in instruction in electric vehicle practise stated that the proposition had been made to and had been accepted by the principal of the West Technical high school of Cleveland, O., a recently completed institution, and during the past summer one of the instructors has been actively employed at one of the large electric automobile factories in Cleveland to prepare himself for conducting the course, learning the construction of electric machines and making a special study of repairing and adjusting. He has made a decided progress in preparation and while he is competent to undertake the work he is to continue to perfect his knowledge by continued research in electric automobile and battery factories and stations. The automobile factory is fostering the proposition with a belief that the students will be available for factory as well as garage service, and that some of them will be competent to serve as salesmen. The course was outlined, and it was stated that it was believed well to

undertake the work

in Cleveland from

the fact that it con-

tained several auto-

mobile factories and

was well located

geographically for

the distribution of

young men who he-

come trained in elec-

dimensions being



Smith, New York Clts.

tric antomobile work. The report of the committee on standardization made a statement that it had secured the adoption of a standard charging plug, the

carefully determined with a view toward meeting every requirement. This plug has already been adopted by nine different concerns, and two others have approved it, and it is the belief that it will be accepted and adopted generally. The committee further reported on the standardization of lamps with the recommendation that the Ediswan bayonet socket be adopted, with the candlepower, voltage and type to be later reported on; on the energy consumption for cars with the recommendation that the maximum tractive effort or draw bar pull be standardized for a given size of tire, so that all vehicles would be on an equal basis with the given tire

The committee on papers made report that the average attendance at the monthly meetings of the association was 150, and made recommendation that the policy of taking up a single subject at a meeting be continued, that the assignment of authors and subjects be made six months or more in advance, that all pos-

sible publicity of the meetings be obtained, and that the papers be printed and distributed to members and others sufficiently in advance of the meetings to awaken interest and develop discussion. The report stated that there was a prospect with the greater activity of the industry and the possibilities for obtaining data and information the association ought to be able to do a very valuable work in promoting the use of the electric vehicle for business and pleasure purposes. The committee suggested close co-operation and the standing committees of the association that material might be provided by these committees for the presentation of papers and reports, especially with reference to data on operating costs.

The committee on rates and charging stations in its report emphasized the need of the energy and influence of the central station in promotive work, and stated that with the increase of numbers the question of properly earing for and maintaining the electric vehicle became more and more important. While owners of large fleets of wagons could afford and olitain all the expert service desired without influence on the economy of operation, it was believed that the man owning one or several vehicles was much impressed with the need of access to large and well equipped garages where machines, and especially batteries, could be cared for by experts at reasonable cost. It was felt that in some sections of the country at least the private garage and charging outfit were becoming less popular and the convenience and economy of the well conducted public service station more keenly realized. From the viewpoint of the central station though the private garage and charging equipment is used in smaller volume and at higher rates a kilowatt-hour than in the public garage, yet when the load factor and quantity is considered the latter class is more desirable and the price is better than with the former, while with the public garage the service from the machines is more constant and better satisfying.

The committee believed that the maximum price charged for energy should be lower rather than higher. It also made recommendation that the monthly total charge for service by garages should have the item for current separated from other charges, the reason being that with the wide difference in the use of vehicles to assume a single monthly price for service results in a low price for some and a high price for others, considering the variance in current consumed. The committee made report and recommendation of a uniform sign for charging stations, it being believed that the increasing use of electric machines would impel the establishment of these on the principal highways as well as in the towns and cities, and urged upon the central stations of the country the necessity of encouraging the use of electric vehicles, maintaining that the vehicle manufacturers ought not to bear the entire burden of development, while co-operation would no doubt be productive of extremely profitable and much quicker results. The recommendation as to the charging station sign was left to the executive committee.

The appointment of a nominating committee and tellers for the election was followed by the presentation of the paper "Where We Stand Today," by C. E. Michel of St. Louis, Mo. He said in part:

Where We Stand Today.

The day for spolacy has passed. The electric of today is a macchiery unit desirated and perfected to do a definite work. Why say had it be a compromise? It is no more a compromise them is a gasoline truck, if retain hauling steam engine, or a trans-Atlantic freighter. It is field or correct application is just from the properties of milesections that disturbed the believer and the question of milesec was set that disturbed the believer and the properties of milesec was set that disturbed the believer and the properties of the pr

the back to the records as late as 1898 and you will see that the question of mileage was sixt that disturbed the believer and the unbeliever alike. At that time, uncording to the version of the maximum of efficiency and capacity and, consequently, the electric was more of a joke than anything else; it was never to be recognized as a legitimate measor of locemotion, and the very limited field would be quickly worked out. Eventual failare, was to be the portion of those who staked their future

There no longer exists a question of mileage. Pick up the catalogues of the modern electric. With few exceptions you will be unable to find a word on the subject and yet the good chearer than would its prototype of 1908; but we now know where the electric belongs and the public knows that II will perform best the work for which I is designed and sold. There are not the subject of 1908; but have now know the proton best few or the proton best performed and the proton best performed and the proton best performed and the sense and the proton best performed and the proton best performed and the proton best performed and the thin amount of the all that this means, the public, the necessity for the cert, and the manufacturer has developed and improved his product to it a condition exactly as has the stem engineer and the ship

Consider the financial condition of the electric vehicle manufacturers. All off the dol one are with in still, and now one are making their appearance with regularity. They are nearly all prospering. To impress this fact I make the statement that taken as a whole the electric vehicle manufacturers today are funnically in better shage than are their brothers in the gas and public need, is entrenched so strongly in its legitimate field that to speak of II with appeals; in full calls.

With our fesous behind as, we should approach the electric truck, not with doubt but with the certain knowledge that it is hopeless to try to keep it out of its own. The handwrither is on the wall and the electrication of our elyt merchandise trying to introduce an article of questionaide merit, for the electric has been proved up. We are not trying to create a field for it. on the other hand, the electric has been developed expectation, in the other hand, the electric has been developed expectation at a result of inherited habits we are acceptible, in lations and objectionable features in horse transportation that would be absolutely fail to the Introduction of any unfamiliar.

The Intelligent, level headed business man of today will put on liths money and time sexting machinery last a soon or he received the property of the property of the property of the received property will push to the lith. The sted is there, or well informed person will question that. It is an convenience of the property of the property of the property of the country is left times that of the treek harding. The vast majority of this trackies braidnes is done in the cities, and of this tert than by any other method. The central station is needed to helius about the quick and correct development of the harddone in its interest in the past four prays is conclusive viddense; that they are convinced of the method of the case, and, they ally.

On the manufacturer resist the real hurden of educating the hustieness world as to what the electric can do rel it and when a central station part in especialism rather of electric the manufacturer of the station of the territory and not to remark to regard to the electric cannot be resistant to the station of the stations in that territory and not to remark to regard that leadily and leave the selling of more cars. The real thinkers among the mon of this country who have the delivery problem to solve, have made their decision. They then others. You are familiar with what the express companies, the breweries, the large department stores and the and they has probling on garden work or evaluations.

After brief discussion R. McAllister Lloyd of New York City read a paper on "Streets and Traffic Conditions as Related to the Electric Vehicle," who said:

Streets and Trame Conditions.

In the early days of the automobile industry it was frequently stated that economical transportation with self-proquently attack that economical transportation with self-prostreets and roads were provided, and particularly that storage battery whiches would require much better streets than were then available in American cities, but fortunately there has development without waiting for perfect streets and the result has been to obtain cehieles for work and pleasure that may be successfully operated under unfavorable street and

The pleasure vehicle equipped with pneumatic three first arrived at a stage of dependability which justified its general adoption. The good roads movement which in the beginning had been energieuously advocated by automobile pomoters their received great impetus from the desire of many automobile users to travel faster and farther,

The commercial automobile has now been so largely adopted that it should be possible to secure co-operation among users in the matter of actianting the necessity for hetter city attests. While I is true that entherers and manufacturers have developed to the control of the con

While It is true that the conditions and difficulties to be met are different in every etly I might be possible for this association and endowor to concentrate endire-rising effort and seasociations and endowor to concentrate endire-rising effort and struction and maintenance of city streets with a view to low-erimit the cost of transportation and consequently the cost of tiving, for the low It costs to transport the necessaries of life-trength the artests the loss the consumer will eventually pay.

I shall not attempt to propose solutions for all the vextual problems that confront the attreet commissioners and departments of water, gas and electricity, but I believe a great deal can be done by securing cooperation of all those interested in providing a surface on our streets which will be suitable for motor vehicle purposes and not subject to frequent disturbance-

So far as this relates to the elective vehicle it can be stated as a fact that the electic vehicle being used at slower speeds than that driven by gaussian suffers less from contact with a supplied to the suffer of the suffer suffers of the supplied supplied to the supplied to the suffer suffers of the supplied to any kind of automobile than for horse drawn waxons, and the advantage in channing from horses to other motive power will now through maintenance can be setting.

I believe the time has arrived when efforts should be made to rouse the public to a realization of the great advantages to be gained and committees appointed by all the automobile organizations to co-operate in the study of present conditions, future requirements and possible solutions.

Much improvement is apparent in all large cities in the matter of regulation of traffic and the public has taken kindly to the methods employed for asstematically controlling. Its streams, but a study of accident statistics indicates that our stream is a study of accident statistics indicates that our stream is a study of accident statistics indicate the form modelles. As we cannot bankly neople from the streets we must study methods of protecting them from infury. The moster truck is not the only offender, and at the pre-

The motor truck is not the only infender, and at the present time passenger vehicles are largely to blane for accident request, but as commercial vehicles drawn by horses have allowed the present of the passenger of the passeng

To to the present time the electric vehicle for both passenger and commercial use has maintained a reputation for same speed and case of manipulation, but there seems to be a growing tendency for salement to advocate higher speeds, and if no protect is raised we shall find within the next few years the entire traffic of our streets speeded up to the pace set by

From an enkineering standpoint it is perfectly practicable increase the average speed of electric wargan and trucks about 5s per certs, but I question the advisability of an olding appraction of electric tracks and advocate them for all methods of prepulsion, not because electricity is inherently, slower than gaseline, but because the interests of humanity are conserved

At the evening session Frank W. Smith of New York City, chairman of the sub-committee on publicity and advertising, made report of the work accomplished by the association through the committee, this detailing the promotive policy established, the names of the

The paper on "Notes on the

Cost of Motor

Trucking" by Prof. Harold Pender and H. F. Thomson of

the electrical engineering department of the Mas-

sachusetts Insti-

tute of Technology,

who are engaged in vehicle transportation research

work, was read by

Prof. Pender. It

was extremely comprehensive and was accompanied

by care fully de-

subscribers to the national co-operative advertising fund, the amounts expended for advertising with each publication used, together with abstracts from letters relative to the service by some of the subscribers, as well as statements from the report of the committee on electric vehicles presented at the national convention of the National Electric Light Association held at Seattle in which general promotion by advertising was advocated. Results, both direct and indirect, were discussed, and the committee recommended that the campaign be continued for another year, that immediate steps be taken to obtain subscriptions for the second year's campaign, that the committee be enlarged, that a publicity department be established and that a system be adouted for following up the inquiries and developing the business that may be created. This report was discussed at length and there was a very comprehensive statement made relative to the productiveness of co-operative advertising by W. D. Mclunkin, this being now engaged in by large interests.



Harvey Robinson, New York City,

tailed tabulations for comparison. This paper was discussed briefly. The second session was concluded by a paper on "Some Recent Developments in the Lead Battery for Electric Vehicles" by Bruce Ford of the Electric Storage Battery Company of Philadelphia.

At the opening of the second day's session the result of the election of officers was announced as follows: President, Arthur Williams of the New York Edison Company, New York City; vice president, Frank W. Smith of the United Light & Power Company, New York City; secretary, Harvey Robinson of the New York Edison Company, New York City; treasurer, Day Baker, district manager for the General Vehicle Company, Boston, Mass.; directors, for three years, W. H. Blood, Jr., of Stone & Webster, Boston, Mass.; P. D. Wagoner of the General Vehicle Company, Long Island City, N. Y.; George H. Kelley, New York City; E. S. Mansfield of the Edison Electric IIluminating Company of Boston, Mass.; for one year, to fill an unexpired term, William G. Bee of the Edison Storage Battery Company, Orange, N. J.

The report of the committee on operating records was presented, which was in part as follows:

Report of Committee on Operating Records.

While your committee has not given this important subject the careful attention which it warrants, the individual members of the committee have given the matter a great deal of thought and have carefully gone over the different systems of accounting and operating records of the various lighting com panies and such large private garages as were available. panies and such large private garages as were symbole. The result of this careful comparison has brought out the fact that while many of the systems in use are good, and every system which is being faithfully carried out is giving satisfaction to which is field assumed to the parties using it, for comparative purposes and for the comparison of the availability and economic possibilities of the electric vehicle with other methods of transportation (for use in an advertising campaign) proper records are not available, nearly all of them being made up from entirely different points of view. It would be absolutely impossible to get the average cost of the various Hems entering impossion to get in average vehicles except by an individual analysis of conditions on the ground. It would, therefore, seem to your committee that this important subject should receive further and more careful consideration.

There are all he present time three associations vitally in-terested in the success of the electric vehicle—the Electric Ve-hicle Association of America, the National Electric Light Association and the Association of Edison Electric Illuminating Companies. Each of these associations has appointed, from time to time, committees covering this subject, and while much valuable work has been done by the various committees noththis really tangible has been worked out. We are of the opinion that arrangements should be made for the working out of a complete system of accounting and operating records, system should be compiled by a competent public accountant who, prior to making his report, should make a tour of the principal cities in the country where electric vehicles are be-ing largely used, and obtain from the principal users the facts ing largely used, and obtain from the principal users the facts as to their requirements and what should be known, so that so their requirements and what should be known, so that looth the small and large garage, the central station, and he department store. In working up this system consideration should also be given to a solitable system of accounting for assoling propoled vehicles. In the transportiation of merchandisc two ilems are given consideration-cost and lime time taken to transport material is satisfactory, the principal

time taken to transport material is satisfactory, the principal them then is cost, and if we can have a true statement of the cost we have nothing to fear from gasoline competition. Until such time as a complete, satisfactory, co-operative re-port can be made your committee would recommend that the operating expense of electric vehicles be carried under three headings, i. e., operating charges, fixed charges and overhead charges. Operating charges should be sub-divided into the following headings: Lubricants, electricity, battery renewals, renewals, repairs material, repairs labor, pointing. F charges should be sub-divided into these headings: Ga charges should be sub-divided into these neadings: Garage general expense, garage labor, squidries, driver, helper. Over-head charges should be sub-divided as follows: Amortization. Interest, fire insurance, liability insurance, administration. In the above arrangement the so-called operating charges are in keneral proportional to the mileage of the car and are directly comparable to similar expenses for gasoline vehicles. The fixed charges are independent of the distance travelled. The so-called overhead charges frequently do not exist as actual expenses, although insurance is generally charged directly against the vehicle.

In addition to the record of costs, there should also be kepl system of operating records of the individual cars covering

a system of operating records of the individual rats covering the following: First—The history of every hattery, including the date of purchase, use, life of plaies, times washed or repaired, and miles operated.

miles appeared. The record in which the history of each tire is 800 movements the miles operated and type of vehicle upon which then were used.

Third—Wherever mostlub a performance record of the vehicle should be kept aboving the data upon the work performance the work of the second of the weight of the work of the weights delivered, wherever the work to such that these units may be used.

In closing, your committee would particularly urge the ex-ecutive committee of the association to endeavor to have, if possible, a co-operative report made by the three associations most directly interested in pushing the electric vehicle husimost affectly interested in positing the electric varieties under this cannot be done, then we would suggest that the executive committee take up the matter with our membership to see if it cannot be accomplished through valuntary subscriptions

The discussion of this report was followed by a number of papers. The members and those attending the convention were the guests at lunckeon of the Edison Electric Illuminating Company of Boston and in the afternoon the session was given over to papers on "The Standardization of the Electric Vehicle" by Alexander Churchward of New York City; on "The Edison Storage Battery in service" by Harold H. Smith of Orange, N. L., and on "The Electric Vehicle from an Insurance Standpoint" by Carl H. Clark, the last being in part as follows:

The Electric Vehicle from an insurance Standpoint.

The Interest of insurance underwriters in the electric vehicle is naturally centred upon those points which affect its de-sirability as an insurance risk, without regard to the mechanical features, except so far us they affect this question. This in turn involves the questions of the possibility of damage which may cause loss under the policy, and also of the facility and cost of repairs.

While the number of losses on electric vehicles is so far not sufficiently great as to occasion any undue concern, are nevertheless occurring with some degree of regularity and from a fairly well defined series of causes. It is thought that a somewhat systematic presentation of the matter, with the sev-eral causes as far as definitely ascertained, may be of interest and may result in bringing out further suggestions for the

improvement of the present conditions.

As to the relative rates of insurance on electric and gasocars, it may be stated in a general way, that the rate on the former is at present about one-bull the average rate on the latter. The rate on the electric curs remains at a fixed percentage, while that on goodine cars is based on a sliding scale, in-ercasing with the age of the car. The rate in electric vehicles has recently been reduced, and since the rates are based on expertence It may be presumed that should the conditions im-prove a further reduction might be made, while if the number and amount of the bosses should increase, an advance would prebably take place. It would seem to be to the advantage of builders to so runstruct their vehicles as to lessen as far as perience it may be presumed that should the conditions im-

possible the risk of fire.

As to the various causes of loss, data have been obtained from the experience of insurance underwriters, and also from me of the large users of electric vehicles of several types source as observed seem to fall more or less definitely into the following classes, the order representing in a general way the relative frequency: ta). Overheating of resistance culls by ac-cidental throwing on of the current while the car is al rest. (b) heat given off by resistance rolls in ordinary use; (c) short circuit in wiring caused by water or snow; (d) short circuit in wiring caused by the chaffing or bruising of the linguistion. tenition while charging.

The above may be called direct causes, and in addition the following indirect or consequential causes may be effect (f) Damage to batteries claimed from rapid discharge by a ort circuit after a fire which has burned the insulation. rg: damage to the interies from the jar of a collision, where the ear itself suffers comparatively small damage. In this classification, what might be called external causes,

In this classification, what suight be called external causes, such as garage fires, spontaneous combustion, fire in adjacent cars, have been excluded; in other words, only such causes as seem to be neculiar to the electric vehicle have been considered. Considering now the causes separately in detail:

(a) Those resulting from accidental throwing on of the current—Fir's from this couse seem to have been the most frequent. They result usually from the accidental movement. frequent. Their result usually from the architectual inventor of the control lever after the ear has been fromable to a sign of the control lever after the ear has been from the control monty the control eleve is thrown from neutral rate of a commonly the control eleve is thrown from neutral rate of a control elever in the consistency of skirts as the operator leaves the car. The resulting level in the resistance has been the cause of many tires, terradium have been unded where the ear has travelled a few feel under the above chromosthus as almost a wild in stoom lank with the same result.

As a remedy for this It is suggested that it might be possible to 01 the control lever with a pawl or latch, similar to that filled an some selective type of transmissions to prevent necl-defull throwing into reverse. This could be arranged to be defilal threwing into reverse. This could be arranged to be operative only in passing out of neutral, and so that the act operative only in passing out of neutral, and so that the act designable to so arrange the connections that the necting of the brake would actouralically break the circuit. It would also seem to be destrable that some method be deviced whereby the drawing out of the plus might be made more positive and less drawing out of the plus might be made more positive and less liable to be neglected, both as a preventative of the from the boye cause and also as acting to prevent, in a measure. The

(b) Heat given off by resistance colls--While under th usual running conditions the heat given off by the colls is read-Usual relations conditions the heat given of by the colds is read-ily dissipated, there seem to be some conditions, such perhaps as a heavy flow of current at low speed, where the heat given off is of an ounsuid amount. This head is often of sufficient latensity to lightle the woodwork in the vicinity. The evident resuedy for this is to allow more nir space

of the resistance, lasulate the woodwork as thoroughly possible, and to provide for an effective executation of air. This particular judget seems not to have received the consideration which it merits, as although apparently a simple matter, many losses have resulted from It.

te) Short circuit in the wiring to water or snow-It has been noted that the accumulation of snew or slush thrown up by the wheels on to the under side of the car, and the building up around connections or possible have spots, has allowed a short circuit with the consequent are starting a lire to the neighboring woodwork

The writer has noted recently the running of the feed wires in metal conduits. The extended use of conduits and junction loxes throughout would eliminate this cause. It would be necessary to so arrange the wires that no rubbing could to necessary to so attaine the Wires limit in rubbling round take place, to went the insulation, and wherever wires leave the conduit, a rubber or fibre thimble should be fitted to prevent any possibility of chaffing on the edge of the conduit. The titling of these conduits or some similar incitod would be a small expense, and one that would weem to lead to many ad-

(d) Short circuit caused by defective insulation. This class is similar to the preceding but differs from it in that it is produced by a defect rather than by an external condition. The produced by a detect rather than 03 an external condition. The insulation may be chaffed by rubbing on some sharp edge or projecting parties, permitting the current to are a ross. Extra care in witing the car would be a step in the direction of prevention, which the more extensive use of the tube or similar substance would also ald. The motal conduits recommended substance would also aid. The metal conduits recommended under the previous heading would, if properly fitted, greatly reduce the Hability from this cause. Loose swingling wires should be avoided as far as possible and all wires should be run so as to avoid vibration and the consequent rubbing.

(e) Iguition while charging but apparently from none of the above named causes - While fires of this nature are not of frequent occurrence, they are more difficult of analy as the ear is likely to be without attendant and in an isolated place. It has been suggested that possibly the gas given off by the balterless has in some way become taulted, as by un-open gas jet or shullar cause. First under those circum-

stances have usually heen severe, which night seem to show that the gas had booded the enr and the tire once updited. With this in mind it might tosuggested that charge-Ing he done his a well utiliated place, Willious open aritheral Hight

(f) When from some of the above causes a short elecute has occurred and the hattertes have discharged quickly, damage has been claimed deterioration of the butteries and con-sequent loss of mile-While losses of just this nature are commen. have when occurring been of rather large amount, requiring the overhauling of the latteries. It is sug-gested that possibly a fuse plug inlight be fit-

prevent the discharge

Day Raker, Boston, Treasurer.

ted in some position near the battery, but accessible, which would fuse and thus

(g) In certain cases of collision, where the damage to the (g) In certain cases of collision, where the damage to like car Hiself has been slight, the latterties have suffered severely from the shork. Were the damage general it would not of currie cause remark, but in the varies eithed the damage was mostly to the batterles. This is not a particularly important phase of the matter, but it might be that a shightly distilled. mounting for the batteries would be of advantage

In conclusion it may be stated that from an insurance standpoint the desirable features would be. Some nicetis of practically compelling the withdrawal of the plus when leaving the car, positive lock on control lever at neutral position; re-sistance well venthated and at proper distance from woodwork, where run in conduit or similar precoution, all loose or swing-ing wires eliminated, charging done without open lights.

It is a fact greatly to be deplored that automobile manufacturers, both of gasoline and electric cars, do not more cummonly make a practice of stamping the wital number some heavy from or steel part where it cannot be defaced. The usual brass phyle attached to the woodwork is very likely to be removed while the car is being pointed, or from some other rause, and not replaced. In the case of a severe fire the brass plate will melt completely, even though attached to the steel frame. In cases like this absolute identification is impossible, and much trouble has been caused, both to owners and adjusters, by this lock. The custom of the makers of one car, of stamping the number into the steel frame in definite location, has several times proven to be of great advantage and this is a point which may be urged as of more than passing importance.

ELECTRIC VEHICLE PRACTISE.

Development from the Primary Battery Tricycle of Andrew L. Riker in America in 1884 to the Pleasure Vehicles and the Riker Wagons of 1898-9—Sultan of Turkey Was Owner of First Practical Carriage in 1886.

By William W. Scott.

THE self-propelled vehicle was an ideal that attracted many ingenious men, and many endeavors were made to create what would be practical, economical and reasonably adaptable for general purposes, but until Daimler in 1885 constructed an operative gasoline engine tricycle comparatively little success was attained. Daimler's invention caused a number of European inventors to direct their attention toward the building of highway vehicles of similar type, but the possibilities of electrical energy were not seriously considered by them until 1887, when the Sultan of

Turkey gave an order to Immisch & Co. of London to build for him a carriage that would not be drawn by lorses, nor propelled by steam, that would be noiseless in operation.

Had the commission

been placed by an individual who regarded money for its actual value, and whose expenditures were definitely limited, it is not probable that it would have been taken seriously, but as the main purpose was to execute an order by royalty without consideration of expense, the company did not hesitate to undertake it. After deliberating the available sources of nowfirst decided upon, but

first decided upon, but his not giving promise of satisfaction the company turned to electricity and built a carriage that was defined as a dog cart. The cost of the machine is not definitely known, but it was undoubtedly a large sum. The experimental work was costly and without previous experience the vehicle could not be otherwise than crude.

This vehicle is illustrated and observation will disclose that it was typical of the dog cart in general appearance. Details of its construction are not available and but little is known of its capacity in speed or mileage, but it was serviceable and it was sufficiently novel to be accepted by the monarch of Turkey. Referring to the illustration it will be seen that it was driven by a motor suspended beneath the body, the armature shaft forming a jackshaft carrying pinions at the outboard ends. Notched segments were bolted to the felloses of the rear wheels to serve as sprackets and the drive was by double side chains, there being a single reduction from the jackshaft to the traction wheels. The brake was a pair of shoes applied in the ordinary form of animal vehicle construction to the steel tires of the rear or driving wheels. The battery, it is understood, was carried beneath the seats.

The body was mounted forward as was an animal cart, with a turntable or fifth wheel, and on this was bolted a toothed segment that meshed with a pinjon on the lower end of the steering column. This column was supported by a standard fitted to the floor of the body, and at the upper end of the post was a crank with a handle by which the carriage was steered. The manner of control and similar interesting data have been lost sight of.

The carriage was sent to Turkey and was used by the Sultan, but with what success is problematical. At that time there was but little general knowledge of electrical charging or the general

requirements of vehicle maintenance, so it is probable that the dog cart for a time literally, if in no other way, amused its owner.

What is believed to be the first electric vehicle ever built in the world was constructed in 1884 by Andrew L. Riker, a Columbia college engineering student, who adapted a tricycle with a motor and driving system, and installed a primary battery as a source of current. This use of a primary battery with small productiveness of current was the reason the vehicle could not be regarded as a success, for it could be driven on a level floor at a speed of about three miles an hour. The machine was used for experimental purposes and it at-



er, compressed air was First Practical Electric Vehicle, a Dog Cart Built for the Sulfirst decided upon, but into of Tarkey by Immisch & Co., London, England, in 1886.

tracted a considerable degree of attention. It was the forerunner of the electric vehicle in America, as its inventor later on became one of the pioneers of the in-



Fred M. Kimbnii, Bullder of the First American Vehicle Driven by a Storage Hattery.

dustry and was the head of the first concern organized in this country to build conveyances of this type.

The second electrie vehicle constructed in America so far as is known was the adaptation of a manually driven trievele of English make. In the summer of 1888 P. W. Pratt of Boston of the Elastic Tip Company, a concern manufacturing rubber goods and novelties, consulted Frederick M. Kim-

ball, of Kimball & Co., electrical engineer and contractor, the firm at that time having a factory in Portland street. Mr. Pratt wanted a machine that could be driven safely and comfortably about the streets of Boston, that could be easily operated and would replace the boress then generally used. He purposed to use electricity and a storage battery, batteries at that time baving attracted considerable public attention. He wanted the vehicle and sought Mr. Kimball to learn whether or not such a construction as he proposed was practices.

Mr. Kinhall undertook to equip the machine and so the tricycle was purchased. The motor was designed of a bi-polar type with a capacity of about onethird horsepower. The motor was installed on a platform and there was a triple reduction through one set of gears and two chains. The battery consisted of six Julien cells and was contained in a wooden crate suspended from the main frame by spiral springs to prevent the jars of road shock damaging the battery. The weight of the machine without a pass-enger was about 300 pounds. In the illustration the vehicle is shown with the battery removed.

When completed the tricycle was first shown at Winthrop spare, and later it was demonstrated on the asphalt paving of Columbus avenue. Next it was shown on the drives in Central Park, New York City, and affer that it was driven on the boardwalk at Atlantic City. On a level, smooth highway it had a speed of from six to eight miles an hour. Mr. Pratt did not find that it was practical for his own service, however, and while a novelty it was not possible to use it in the work it was loped it would be useful for. Wherever shown the tricycle attracted much attention and favorable comment.

The third machine built was constructed by Mr. Riker in 1891, this being a tricycle that was equipped with a motor of about one-eighth horsepower and in which a storage battery was the source of current. This was a much more successful vehicle than the first because of the different form of battery, and it was used for experimental work from which was later developed the pleasure cars and the service machines produced by the Riker Electric Vehicle Company at Newark

The first practical electric road schiele of America was huilt in 1891, contemporary with Mr. Riker's experimental work, by the Holtzer-Cabot Electric Company, Boston, to the order of Fiske Warren of Boston, and it may be said that this was a very well thought out and developed construction. In this, a runabout, there was originality in that the motor was suspended transversely in the classis frame, the drive being direct from the sprockets on the outboard ends of the long armature shaft to the sprockets on the rear wheels through chains, the differential being incorporated in the armature shaft. The following description of the vehicle was published:

The carriage here Hustrated was built for Fiske Warren. Esq., in 1891. Its scating capacity is subordinated to the room required for the storage batteries in order to permit as long a run as nosoble on one charge.

ran as possible on one charge.
It is steered by a hand wheel connected with the front wheels by a reducing gear, thus allowing better control when running over rough roads and is arranged in such a way, that it can be locked in any position to a foot latch, thus keeping the our right principle is not a foot latch. Thus keeping the our right principle is not staged in the level of the second of the control of

For varying the speed a actice parallel controller is placed under the carriage body. It is operated by a lever boarded conveniently to the operator. There is also a reversing swifeallowing the mater to run in either direction. A hattery consisting of 00 "11-8" chloride accumulator cells is coupled in centrol in four groups of to cells each, this con-

allowing the model of the right is entered a controlled to the controlled con

On the dasher is a single pole switch that is used to cut



First Practical Electric Tricycle Bullt in America, Constructed for C. W. Pratt of Boston by Fred M. Kimbalt of That City in 1988.

out the motor when charging the batterles and also prevents the carriage from being started when left unattended. The latterles may be charged directly from a 110-yolf syslem, charging terminals for this purpose being placed directly in front of the controller within easy reach. The motor is series wound, especially designed for this carriage with a maximum speed of 600 rpm, and has a capacity of four to five horse-power. The differential gears allowing the year wheels to make a different speed when turning corners are directly con-



Second Two-Passenger Electric Vehicle of Vmerica, Bulli by W. H. Blood, Jr., at Kansas City, Wo., in 1892-3.

needed to the armsture shaft. The armsture is seared directly to the rear which by a special spready claim and runs over cut goars which are attached to the rear whochs. The spreader the articles is running at its lightest special by this method we have done away with the intermediate scare commonly arrest their off fetchion.

While the weight of the carriage with motor and batteries is nearly 2000 pounds, yet the carriage can be worked with great case and is in every way a satisfactorily running carriage.

So far as is known no illustration of this vehicle exists. It will be realized that it had surprising capacity considering the batteries, and aside from absence of current measuring instruments was as complete as are the machines of the latest type.

The second practical form of road vehicle was that designed and built in 1893 by W. H. Bonod, Jr., then of the Franklin Electric Company, Kansas City, Mo., who for the first two years of its existence was president of the Electric Vehicle Association of America, and is now connected with the Stone & Webster Corporation. Mr. Blood was then an active electrical engineer and he was commissioned by a Kansas City physician to build for him an electric runabout or buggy. The machine in general appearance was not unlike a horse vehicle, and its main difference was in the small front wheels and the angle of the foor forward.

The motor was specially built and while rated at three horsepower would bevelop double its rating. The motor was suspended from the rear of the body and the armature shaft was mounted in two plain bearings carried in two brackets. The shaft was long and at either end was a rawhide pulley. These pulleys contacted with two steed drums bolted to the rear wheel spokes in much the same way that brake drums are now attached. The weight of the motor was considerable and when adjusted it was with the rawhide pulleys against the wheel drums, so that when the motor was recolved the machine was driven by friction. The difference in the sizes of the pulleys and the drums gave sufficient reduction. Each main bearing bracket was fitted with a bolt that extended upward to the bearing, and on each bolt was a nm. Attached to the units were levers extending forward, and linked to these were bell crank levers compled to toe pedal shafts. There was no differential and to compensate for the difference in wheel speed in making turns the toe pedal at the inner side was pressed and the nut was turned on the bolt, lifting the rawhide pulley from the wheel drum so that the wheel turned free on the axle. When the pedal was released the armature shaft bearing was dropped to its normal position and driving contact was restored. The clearance between the pullevs and the wheel drums was comparatively small and the drive was found to be remarkably effective. Mr. Blood says that it was the only vehicle he has ever seen that was absolutely noiseless in its operation.

The battery was built by the Electric Storage Battery Company and was of 30 rells, being carried in a crate beneath the seat. The vehicle was steered by a vertical post on the top of which was a hand wheel, and beneath the wheel was the control lever. The body was mounted forward on a turntable or fifth wheel, and a toothed segment was bolted to the turntable and a pinion at the base of the steering column meshed with the segment. The wheels were equipped with solid tires, these being of the type then being adopted for carriages and used on bicycles. The speed of the vehicle was about 12 miles an hour and it was found to be an excellent hill climber, ascending practically all of the steep grades in Kansas City. After a number of trials in the spring of 1893 it was decided advisable to install a larger battery to increase the mileage capacity, and, as may appear peculiar with the methods of the present day, the machine was placed in a freight car and shipped to Philadelphia, where the battery maker was to make the new installation. En route the train was wrecked and the vehicle destroyed.

It will be understood that the early machines



First Electric Brake of America, Built by the Holtzer-Unbol Electric Company of Boston for Plake Warren in 1893—This Burchine Cantained J. Anderson, William Carlo, Theoband Amin, E. H. Thielscher, George Innes, E. F. Venenmb, Vibert I., Smyer and Angast Andrea.

driven by electricity were practical, but the storage batteries were of small capacity as compared with those built today, the jars were constructed of material that was brittle and easily broken, the cells were much heavier and the batteries constituted a considerable load, necessitating a consumption of a relatively



The Electric Vehicle Purchased by the General Electric Company in 1807 for Experimental Purcoses.

larger volume of energy to drive the vehicle. The trials of road machines in 1893 at Chicago, and the following year in New York stimulated interest, and both in Europe and America consulerable attention was directed toward the development of electric carriages. As may have been noted the first electric in Europe was designed for four passengers, but the first in America was for but one and Mr. Blood's was for

The third practical electric vehicle built in America was constructed in 1893 by the Holtzer-Cabot Electric Company of Brookline, then becated in Boston, which was designed by the engineers of that concern. This was a distinct development as compared with Mr. Warren's first machine. So decidedly a progression was this conveyance that the following description is worthy of reproduction. The carriage was used for several years and a new motor was installed in it in 1895;

The Hulker-Cahot Electric Company of Boston recently completed for a wealthy resident of that elly an electric wages modelled after the English brake, capable of seating six ted girl persons. Its weight is 5100 pumpls and it is of the most durable and solid construction throughout.

ble and solid construction throughout. The lattest are contained in the last's and under the front seat, and the tap of ever of the hody, which supports the two contains the front seat and the tap of ever of the hody, which supports the two contains the front seat the tap the cells and all connections are exceeded for examination or repairs. The hatteries comprise the contained the seat of the construction of the contained the seat of the contribution discharge ratio of \$2\$ anyrers. The cells are arranged in four groups of 11 each, and connected to the motor Brought as early aprachic contribute, which patts the groups in multiple of the contained the seat of
reads, the hatterfee have been equal to the emergency. The running gear is very substantially hullt to stand the strain in order in reduce friction the wheels are provided with hall bearings. The holy of the waren is water tight and water proof; painl has been illuctally used so that under ne circumstances can the beraking or spilling of a cell dismass the molor

The steering is arranged at the buts of the front axie, heavy crank levers being geared to the steering shaft, which is provided with a hitgele handle. A bonded segment with a spring latch is also arranged so that by a slight pressure of the foot the operator may lock the wheels at any angle. NowWitheland-

ng Its immense weight, the wagon can be kulded by one band it any speed.

at any speed.

The motor is a special four-pole series wound, of 7.5 horse-power capacity and weighs 150 pounds. In speed at full bod is 25 rips and its efficiency speer cent. A phosphor former control of the property of the shaft of which is divided and connected brough a differential generation, allowing the wheels to run at different speeds when counding corners. The linemediate shaft drives the hind wheels directly be chains, one on each side. The

speeds when remains recovery that the course of each other. The motor and scorting are protected by a light between cases. For renvenience in backing a reversing switch is mounted on the outstellar are and includes with 1 as of both the mointed on the outstellar are and includes with 1 as of both the mointed speed may be varied from four to 15 miles an inner and all ore dimer process are accomplished with case. The lacks is of dimer parabons are accomplished with case. The lacks is of purposes. Two 10 candle-power lamps (grarish) light by shift.

The sagan work was done by channer Thomas & Ca. care

One of the first European electric vehicles to attract attention was that built by Berliet and given public trials in 1895, an illustration of which is shown. This was also a two-passenger type and it was steered with a lever at the side, the front wheels being small and turning under the body, the turniable of the animal carriage being retained. The battery was carried under the seat. The mechanical details of this vehicle are not available, although they would prove of decided interest.

Between 1893 and 1897 experiments to developelectric vehicles were carried on by a number of persons, there being decided interest taken in the passibilities of these machines. In these years the experimental work justified the belief that there were such qualities as were desirable in both pleasure and service conveyances. The Electric Vehicle Company was organized and a factory established at Hartford, Com, in 1897, and the same year the Riker Electric Vehicle Company was located at Newark, N. J. Both concerns at first produced two-passenger earriages of the victoria type. Both concerns milized the product of the Electric Storage Batters Company for current.



A Berllet Electric Carriage Balli In France in 1805.

Both the Columbia and the Riker vehicles had distinctive features, those of the further being generally those to be found in the machines of the present day,

but the Riker cars had numerous adaptations to meet the requirements of road service. One of these was the incorporation of a differential gearing in a rear hub instead of in the axle to secure the full strength of the construction, this being adopted for the pleasure carriages. Another was pivoting the front axles in the hubs of the front wheels to permit of turning, instead of the vokes and the steering knuckles, and the third was the use of perches, or reach rods connecting the front and rear axles, to maintain uniformity of driving stresses upon all four wheels. With the purpose of obtaining a flexible frame the end of one reach rod and a stay were brazed to the front axle. The corresponding end of the other rod was movable on the axle and was retained by collars. At the rear both rod ends were carried on mountings that were movable on the axle. The two rods were maintained in exact relation and stayed by a cross rod. The driving axle was a solid shaft driven by a chain from the armature shaft



The First Baker Electric Runnbont, in Which is Sented Mr. and Mrs. Thomas 5, Edison.

of the motor by sprockets. Reference is made to this construction to show the different directions of experimentation with the electric vehicle.

The first electric service wagon was built in 1898 by the Riker Electric Vehicle Company, and three of these machines were constructed to the order of B, Altman & Co., New York City, they being of 500 pounds capacity. These differed from the pleasure car construction in that each rear wheel was driven by a separate motor, this design eliminating the need of a compensating gear in the rear axle, that member being solid. The front wheels were mounted with the pivots within the hubs, and the front and rear axles were connected with the reach rods or perches. The Riker pivoted front limbs were built with ball bearings of the cup and cone type, and the rear wheels revolved on plain bearings. The batteries were carried in boxes or cradles slung between the wheels. During the year three more of these machines were built for B. Altman & Co., by the Riker Electric Vehicle Company, B. Altman & Co. has the distinction of being the first concern in the world to employ a flect of electric delivery wagons. The bodies were of the panel design and were built by F. R. Wood & Son.

While the electric machines were simply an adjunct to the large delivery equipment of the Altman company, and were probably installed primarily with a view of their advertising value, it is a surprising fact that one of these wagons is in regular service today and is doing such work as to justify its regular nee with the latest constructions. It is stated that some of the others are still serviceable. From this beginning the company has constantly added to its electric wagons and has as consistently lessened the number of animal transports.

The first experimental work of the General Electric Company with relation to electric vehicles was carried on with a machine bought in 1897 and which was tried and observed at the factory at Lynn, Mass. An illustration of this vehicle is shown.

The Pope-Waverley Company was established in 1888 and this concern began the production of a light runabout of the buggy type, the bodies being of pianobox design and intended for two passengers only.

The first five-ton electric truck was built by the Riker Electric Vehicle Company to the order of the Most & Chandon Champague Company and delivered to that concern early in 1899, this having all the characteristics of the smaller machines. This was as well the first large truck driven by any power, and it was a carrissity as well as an entirely dependable equipment.

The Baker Motor Vehicle Company, Cleveland, though organized in 1898, did not place a machine in the market until 1800, and that was a light runabout with the usual piane-box body that appeared to meet with decided approval.

The Riker machines were a success from an electrical point of view and were in every way dependable, but because of the limitations of batteries and the comparatively small radius of movement, combined with the lack of knowledge of the people, were not regarded with favor. Mr. Riker directed his attention to other types of vehicles and associated himself with the Locomobile Company of America, which first built a steam carriage and later on gasoline cars. With his retirement from the pleasure and service wagon field this left the Electric Vehicle Company, the Pope-Waverley Company and the Baker Motor Vehiele Company as the principal, if not the only producers of electric pleasure machines, but the Vehicle Equipment Company was formed to produce service wagons of all kinds, and this concern marketed its first wagon in January, 1901. Later on the Electric Vehicle Company built service wagons, these differing in every way from the pleasure car designs,

As may have been assumed, each firm engaging in building electrics sought to perfect its machines. To follow the experience of each builder and designer even in briefest form would require many volumes. It is, however, desirable to refer to some developments that are worthy of the attention of every one interested in electric vehicles. The Immisch and the Holtzer-Cabot vehicles were the first in Enrope and America to have the motors suspended transversely in the chassis, both utilizing the motor armature shafts for driving. The Baker was the first in which the motor was contained in an axle housing, there being direct drive by the armature through shafts on which the wheels were fixed, this being a semi-floating construction. The differential was contained within the axle shell with the motor. The axles of the Baker machines were connected with perches or radius rods, this maintaining a correct relation. The Riker characteristics have been stated.

The early pleasure cars were heavy and limited to a comparatively small radius because of the weight and lack of battery capacity. Not only this the actual knowledge of the batteries, with reference to care and maintenance, was limited to a comparatively few persons, and the production of current was seldom with a view to the development of electric vehicle use. Motors as built in the late 90's were as thoroughly dependable and enduring as those of today, and there were available numerous devices for regulating and controlling the use of current, but one great deterrent to general adoption was cost. It is worthy of note, however, that with the attention of the large electric manufacturing concerns directed toward the production of motors, controllers, charging panels, automatic controls and regulators and other essential equipment for vehicle and garage use and the battery manufacturers endeavoring to perfect their batteries with a view of lessening weight and increasing capacities, the industry made substantial and enduring progress.

One thing that developed the electric motor, without reference to the possibilities or the requirements of the builders of electric vehicles, was the enormous demand for these machines for industrial purposes, and especially railway work. It was as essential to control railroad cars as road machines and this entailed the perfection of the controller. Besides this the need for storage batteries impelled the makers to improve them in every respect with regard to service, endurance and economy, and here again was a condition that was stimulating to the makers of vehicles.

It was merely following standard mechanical practise to employ ball and roller bearings in electric car and wagon construction. The main object was to minimize friction and increase mileage. With the use of such bearings the service was materially improved and the expense of operation lessened. With pleasure carsendeavor was made to minimize weight and to increase comfort and convenience. The complications were few and different forms of drives were employed, these increasing in number with the developments from experimental and service tests. The differential was very generally adopted; with many of the makes it was incorporated with the jackshaft. The indivibual

wheel motor was abandoned by a number after extended experience and with the use of the chain drive with jackshaft reduction, although this is still used in different forms by three concerns.

(To Be Continued.)

WILL DOUBLE SIZE OF PLANT.

Demand for Philadelphia Storage Batteries Makes Imperative Added Facilities for Production.

The Philadelphia Storage Battery Company at Ontand C streets, Philadelphia, Penm, is shortly to erect an addition to the structure now occupied by it that will very nearly double its factory production. The factory is a modern two-story brick building of modern construction, a section of the second floor being given over to the office.

The demand for the batteries, especially the Philadelphia thin plate type, has been such that it could not be supplied, and plans were made for the extension of the building to twice its size in ground area occupied and to the same height. It is expected that the work will be pushed to completion that the company may have as quickly as is possible the productiveness that is necessitated by the service of its batteries.

NEW BAKER TRUCK CATALOGUE.

Well Designed Publication Which Gives Specific Information of Complete Line for Coming Season.

The Baker Motor Vehicle Company, Cleveland, O., has issued a new catalogue of electric service wagons it builds that is decidedly interesting. The booklet is unusually well designed and printed, and differs from the average production description in that it is given over largely to illustrations showing the different forms of work for which Baker vehicles are used. There is a brief statement as to the actual value of electric wagons and an emphasis of the qualities that should be considered by all who require vehicular transportation, and then follows a summary of the mechanical construction of the chassis. This section of the catalogue is illustrated by side and plan views of the different types of chassis, which differ principally in size, and on the pages with these views are some of the specifications of the model shown.

The catalogue gives specific information of the Baker 3.5-ton truck, one of which was recently built for the United States Bureau of Printing and Engraving at Washington, and of the Baker service runabout, which is shaft driven through bevel gears. This is designed especially for light, fast service. In addition there is an outline of Baker tractors, which are built in three sizes and designed for hauling trailers. The catalogue is decidedly comprehensive and valuable from the fact that it demonstrates some of the possibilities of electric vehicle service.

ELECTRIC TRUCKS IN TEXTILE SERVICE.

M ANUFACTURING today is the science of production with reference to quality and volume, and success is absolutely dependent upon economy. There may be exceptions where a product is sufficiently protected that it cannot be imitated or a substitute found, but universality of use is limited only by the cost. While it is the endeavor of every manufacturer to improve quality and to cleapper expense of producing, it is evident that economies cannot be brought about unless the accounting is such as to establish cost to an exceedingly small fraction of a cent.

There are so many influences affecting manufacturing and the units are so small and numerous, that what may appear to be a ridiculously minute sum will in the aggregate be a comparatively large amount of money, and dividends may depend upon the ratio of the cost and selling prices measured by the thousandths of a cent. This is particularly true of textile veloped to a state where the buyer considers simply the price he must pay, and with the consumer the cost is the governing factor in his choice.

Textile manufacturers have studied the problems for years and so far as possible have improved their facilities and equipment that the production shall be increased, while labor has insisted upon shorter working hours, and as capital must always have a margin of profit it has been necessary to establish systems that will in every way be productive of economics.

Transportation rharges have for many years been considered with extreme care, and in many instances mills and shops have been located with a view of minimizing vehicle haulage, but until the production of mechanical vehicles animals were utilized and with the usual uncertainty as to expense. Strangely enough, despite the system generally applied to every other mill department, little attention was given to



Interior of the Garage of the Amoskeng Manufacturing Company, Manchester, N. H., in Which is Kept Its Fleet of Seven Electrics.

manufacturing. New England has for more than a century been the location of the largest concerns in America manufacturing outon and wooden cloths, this being due largely to the fact that these industries were established before the expansion of the country, and that at the time of establishment the natural resources for bower were utilized so far as usosible.

Not only this, but during this century the people of New England have become experts in this industry and with the creation of homes and family ties it was logical enough that additional mills were built and help sought where operatives could be secured who could produce the class of goods desired. All this has not been changed materially with the development of the industry, and today the mills of the eastern part of the country are long distances from the sources of supply of raw materials and fuel, and it is necessary to pay heavily for transportation of the material and supplies, as well as for distributing the finished products. Competition has been de-

vehicular transportation, and when the possibilities of motor wagous and trucks were brought to their attention the men who would not hesitate to spend thousands of dollars for an improvement that would comomize production, challenged the suggestion of the practicality of automobile vehicles and demanded facts and figures that could not be applied more than generally at best, and which could not be regarded as being more than an example.

In some instances manufacturers have been 80 much impressed that they were willing to undertake to educate themselves by working the machines in their own service, and by studying the work accomplished and the methods employed learn wherein it was possible to decrease the cost of the work performed with animals or accomplish more work at no greater cost. The history of the pleasure automobile is well enough known to the majority of readers, but where a business proposition is under consideration the tendency has generally been to experiment, and under confidence in the proposition of the proposition is under consideration the tendency has generally been to experiment, and under confidence in the proposition is under confidence in the proposition is under consideration.

tions that would be looked upon as in every way unproductive of good results.

Were a manufacturer to place an improved ma-



One-Ton Wagon of the Pleet of Six Utilized by the Pacific Mills, Lawrence, Wass.

chine heside what he had been using he would be able to see in a comparatively short time the merits of the new and its special value to him, but he would not delay utilizing methods that would secure the fullest measure of productiveness of the new, and he would be perfectly willing to replace his entire equipment to bring about a more satisfactory product or to lessen the cost. Yet when he placed a motor vehicle in his service and contrasted its work with what had been done with animals he generally was or is unable to fix definite economical facts because of the lack of proper accounting of his haulage expense.

There are concerns, of course, that have possession of records that will establish without doubt the value of the motor wagon, but this information has not been general publicity, and very frequently it is withheld because of the belief that were this knowledge to be utilized by competitors it would be quite as economical to them, and there would be no actual value in the service because rivals would have the same opportunities for economy. It is not probable that this attitude would be acknowledged by the majority of men, but it is an indisputable fact that data are refused as a rule by manufacturers, often with the statement that records have not been well kept. Regarded from this point of view, it is surprising that concerns that have taken up motor vehicles as an economy have neglected to obtain the facts that would establish the value of the vehicles to them, which would appear to be most important of all knowledge sought, and it must be accepted that if this statement is correct the methods employed could not be expected to realize the service possible with a practical system.

Turning to the use of vehicles by textile manufacturers it will be understood that many have found a decided saving in installing them, and this is true of those who have systematically accounted their work and expense and contrasted these facts with the actual or estimated expense of horses. It is impossible to regard the work necessary about the mills as an average, as each service requirement differs materially, but where some demands haulage of fuel, supplies of all kinds, raw materials, and the finished goods to the bleacheries or print works, or to the railroad or steamer terminals, others have but a comparatively small part of this work to perform. Not only this, the highway conditions are extremely varied and the influence of this upon expense is something that cannot be averaged, while the cost of labor is another important factor in establishing expense.

It has been invariably the experience with those who have utilized motor wagons in their haulage that changed methods as compared with those used with animals were imperative, and the fact that this has been realized by some line deterred the adoption of the new form of transportation, because there are many who do not care to make what would be necessary transition of what may be regarded as a system. As a matter of fact it is doubtful that any person would be willing to consider what is a cause of unnecessary expense an endurable condition, yet it is surprising that so many men, knowing the extravagance of animals from every viewpoint, are willing to continue their nes.

It is undoubtedly true that many of the concerns are small and it is also a fact that many of the mills are located on the lines of railroads for obvious reasons, but there must necessarily be haulage of differing classes which is necessary that the mills be operated. In the selection of the type of motor vehicle to be used for the mill there are many reasons why the electric ought to be considered. The one that has seemingly appealed to many manufacturers is the opportunity to utilize current, for the majority of manufactories are today lighted by electricity, and the power plants are generally equipped for its production at the least possible cost. There may be issue taken with the necessity of charging the vehicle nights after the service of the day on the ground that this would entail operation of the power plant for a considerable number of hours in excess of normal requirements, this causing a considerable expense, and yet it



Two-Ton General Vehicle Wagon Engaged in the Hauinge Service of the Pepperril Manufacturing Company, Hiddeford, Me.

is a fact that the auxiliaries usually operated in plants of this kind are sufficient to meet any reasonable demand and with tractically little additional cost. Another quality that must necessarily appeal to the men who is seeking economy is the unquestioned endurance of the electric vehicle in all services. There



One-Ton General Vehicle Wagon with Special Equipment Used by Pepperell Manufacturing Company, Hiddeford, Me,

are many electric trucks in operation in New York that have been in daily use for 10 years or more, and these are giving good mileages and with such economy that they are retained in service with those of more modern construction. There has been one difficulty in the past, and that is securing the services of electricians competent to properly maintain the machines, and yet the desirable men are becoming more numerous daily and they are available for all who care to engage them.

While it cannot be said that there has been general adoption of the electric vehicle in textile service it is a fact that the corporations that have adopted them have continued their use and have added to the number, and with the experience of from one to six years it must be helieved that had weaknesses or serious fault been developed these would have been deterrents against additional purchases. Going over the list of concerns that are using electric machines it will be realized that they represent the largest and most progressive in the industries, and that they are widely known and successful hecause of the policies of the men who control them.

Perhaps one of the most striking examples of the use of the electric vehicles may be seen at the Amoskeag Manufacturing Company's plant at Manchester, N. H., a corporation that is regarded as the largest producer of cotton cloth in the world, and which has equipment and facilities worthy of the place that it occupies in manufacturing. This company is located inland and much of its power is obtained from the Merrimac river. Railroad facilities are admirable and arranged to obtain the most economical service, so that hanlage is minimized, but there is a large volume of work that must be performed by highway vehicles and a large part of this is done with a fleet of seven Electric Vehicle and General Vehicle wagons and

The company's plant is located on the banks of the river and there are numerous grades, several of them being steep and sharp, but these would have effect on

haulage of any kind. An idea of one of these ascents may be gained by an accompanying illustration. Starting with one machine the company has added to its equipment the sizes that were believed best for the purpose, so that now its wagons and trucks range from one to five tons capacity. The company has established a garage, which is admirably equipped, and in this the machines are given the attention and care required. The company maintains its property at a high state of efficiency and this applies to the electrics as well. They are operated by a system that is productive of extremely consistent results, and no matter what the weather conditions the machines are always serviceable and doing the work required. It is true that the maintenance of the vehicles is one reason for the success with their use, and perhaps the largest factor in their economy is that they are not neglected, but this policy existed when animals were used and in this respect the service is at parity.

Another illustration is afforded by the Pacific Mills at Lawrence, Mass., which has five General Vehicle wagons and trucks in operation and it has ordered another of the same make. The company has experience with mechanical vehicles extending over a period of nearly four years, and it now has but a single horse in use. One of the most interesting phases of this installation is that the hauls are short and yet with this character of service the company is doing its work at a cost of 80 per cent, of the expense for horses, this fact being known through highly systematized records which were utilized first with a view of minimizing the animal expense. There is no denial of the strength of this comparison, nor of the facts developed. The company has erected an ideal garage and maintains a well equipped repair department in which its machines are housed, and by the use of a system that accounts for the time of every driver and each truck, which obviates delays in the delivery and receipt of freight, which places the responsibility of the opera-



Two-Ton Wagon, One of the Seven General Vehicle and Electric Vehicle Machines Worked by the Amoskeng Manufacturing Company, Manchater, N. H.

tion of the machines on one man and the burden of maintenance on another, it has reached an efficiency that could hardly be excelled. One thing that impresses itself upon the observer is the fact that horse methods have been forgotten and the work of the vehicles has been planned with the same care that



The Vashua Manafacturing Company, Vashua, N. H., Uses Twoof These General Vehicle Machines in Its Regular Service.

factory production has been developed, this being considered absolutely essential. It is a decided contrast with the policy of those who have not believed that haulage is worthy attention and systematizing.

The Arlington Mills, Lawrence, Mass, has in its service three Studebaker electric trucks that have been in use for several years, and these have been found to decidedly economize the haulage in the yard and the city. The machines have been well carel for and operated with discretion, and they have proven to be satisfactory from every point of view. The company has a small garage in which the trucks are stored and it provides its own current from its power plant. The company has utilized the vehicles a sufficient length of time to demonstrate their practicality and usefulness from every point of view, and has at no time needed to recourse to any other means of transportation.

The Pepperell Manufacturing Company, Biddeford, Me., has used two General Vehicle wagons for several years, one of them being of a ton and the other of two-ton capacity. The larger machine is utilized for general freight work and the other is worked a part of the time earrying eloth from the weave shed to the finishing department. For this work an open express body is used and the cloth is placed on a special floor truck in the weave shed and when the wagon is backed to the door of the shed the truck is pushed into the wagon body, which it is designed to fit. In this way the handling is expedited and the time of the wagon economized. As an evidence of what has been accomplished with this method it may be said that the wagon and two men has replaced seven men and two single horse wagons, and the work is as well if not better done. During the extremely cold Mame winters and in heavy falls of snow the two electrics have been worked with entirely satisfactory results.

The Nashua Manufacturing Company, Nashua, N. H., is using two electric trucks that have been in service for several years, this being a result of the work done by the Amoskeag installation. The work is larger by of the same character, mill yard haulage and some outside transportation, and this, too, has been in every way satisfying to the officials of the company. The company's first vehicle was followed after a reasonable period by the second, and then a small garage was equipped, where the machines are cared for. The expectations for economy have been in every way realized, and the prospects are that they will be further increased.

The Cocheco Mills, Dover, N. H., which corporation is controlled by the same interests that maintain the Pacific Mills, has two electric trucks in use, one of these being a five-ton machine that is equipped with a dumping body and is utilized for coal haulage a considerable part of the time. The other is worked in transportation. As might be assumed the vehicles are well cared for and maintained at a high standard, and, being systematically worked, have been economical and extremely serviceable as compared with animal service.

The Glenlyon Dye Works, Phillipsdale, R. L, which is a department of the manmoth Saylesville bleacheries at Saylesville, R. L, utilizes one five-ton electric truck, which has been in constant use for about a year. This vehicle has been worked every day and throughout all kinds of weather, and has given extremely satisfactory mileage at comparatively small cost.

Baker Salesmen's Convention—Baker Motor Vehicle Company's agents and salesmen to the number of nearly 150 attended the annual convention of the seliing organization of that concern, which was held at the factory at Cleveland, O. Oct. 16-18. Much enthusiasm was manifested in the machines the company is producing and in the fact that during the first half of 1912 the development of the company exceeded that of any other similar period. This applies to both pleasure and service vehicles and there was a general



One of a Group of Three Studebaker Trucks in the Service of the Arlington Wills, Lawrence, Mass.

belief that the last part of the year would be even more productive of results. The outlook for 1913 was conceded to be equally as promising.



VOL. III. NOVEMBER, 1912

AUTOMOBILE JOURNAL PUBLISHING COMPANY Times Bldg., Pawtucket, R. I.

Times Bldg., Pawtucket, R. I.
William H. Black, Treasurer. D. O. Black, Jr., Secretary.
Publishers of

Publishers of

THE AUTOMOBILE JOURNAL THE ACCESSORY AND GARAGE JOURNAL Those Particket 1996.

ERITORIAL DEPARTMENT

CARL A. PRENCH. C. P. SRATTICK.

WILLIAM W. SCOTT.

ADVERTISING DEPARTMENT:

New Engined—
John W. Queen, 6 Bencon Street, Boston, Muss.
Central Staten—

W. R. Blodgett, 25 West 42nd Street New York City.
'Phone Bryant 372s.

Western States-C. A. Eldredge, 304 Sun Building, Detroit, Mich.

Phone Cherry 2240.
P. G. Lurlan, 4707 Magnolla Ave., Chleago, Ill.

PUBLISHED THE FIRST OF EACH MONTH.

SI BSCHIPTIONS

The United States and Mexico, the year, \$1 in ndvnnee; Canada and Foreign Countries in Postal Union, the year, \$2 in advance. Pifteen cents the copy.

AHAERTISING RATES.

Information kiven on request. All advertising copy must reach this office not later than the 25th of the month preceding. Anonymous communications not considered. Correspondence on tractors, all motor driven from the anomalication of the tractors, all motor driven farm, fire and municipal apparaius, the motor industry and the trade, will receive attention. Stamps must be enclosed to hunce return of unsoil-

Entered as second class matter, February 25, 1911, at the Postoffice at Pawincket, R. L., under the Act of March 3rd, 1879.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCL-LATION, ETC.

Of The Motor Track. Published Monthly at Puntucket, Rhode Island, required by the act of August 24, 1912.

NOTE: This statement is to be made in duplicate, both copies to be divered by the publisher to the postmater, who will sent one copy to the

NOTE:—This statement is to be made in doublinate, both eagles to be delivered by the meldidener to the postulation, with well as and one copy to the red of the meldidener to the postulation of the postul

None Known bondholders, mortgagers and other security holders, holding I per cont or more of total amount of bonds, mortgages or other securities;

Sworn to and filed with Postnucter October 1, 1912 ROSCOE M. DENTER Notery Public My commission explices one 50, 1914.

MOVING THE RECORD CROPS.

The reports from all sections of the country indiate that bumper crops are the rule, but past experience suggests this will have no appreciable effect upon the so-called high cost of living, unless some plan is devised whereby the annual shortage of railroad cars is relieved. And right here the motor truck offers a solution of the difficulty at both ends of the line.

The grower who substitutes the mechanical transport for the more antiquated horse or mule wagon, relieves the situation by boding the cars to capacity, whereas in former years it often has been necessary to start the cars on their way to the eastern markets when only partially loaded. This plan has not only resulted in a higher freight charge in the aggregate, but has delayed subsequent shipments, by reason of the fact that the cars were in the flast waiting to be unloaded at a time when they should be in the West to take on another load.

The motor truck also can aid at the receiving end, since it is possible, leaving out of consideration for the moment the quick loading and unboading devices, to cut down the lauling time required with horses, Given the ability to load the cars to their full capacity in the West and to reduce the time required for unboading in the East, there should be no reason for a short-age in railroad cars, while the cost of delivering the products of the soil to the ultimate consumer should be reduced in a proportionate degree.

THE OVERLOADING PROBLEM.

With rare exceptions mechanical vehicles are overloaded by the users. Few owners will establish a limit for load weight and insist upon it being observed. The majority will overload and believe they are making a profit by so doing, but they will fail to provide means or facilities for quick handling of the freights, when there is more actual loss than could be compensated for by hauling twice the capacity of the machine at a single load.

There must necessarily be an allowance for loading and unloading. The man who is ntilizing motor wagons must make such provisions as will minimize the time of men and vehicles at the place where freight is received for haulage, and it is imperative that those to whom the freights are sent should have facilities for quick delivery. The railroads charge demurrage on cars when unloading is delayed. Idle transports mean a loss to them. With the business man, whose delivery is limited, lost time is even more expensive.

There are circumstances which justify some delay, but those should be known and means taken to minimize retardation of service. Failure to make such provision is plainly a fault that can be placed. The power wagon has every quality that can be desired, and if these are not utilized to the greatest advantage it is patent that the methods are wrong and should be replaced by a carefully arranged system.

Overleading does not compensate for negligence or absence of organization. Hauling excessive weights is not a gain, any more than overworking an animal or a man. This can be avoided. Absence of a perfected delivery is lack of business capacity and the loss would be quite the same, no matter what the form of conveyance used.

WHITE TRUCKS MAKE SPLENDID SHOWING.

Experiences of Two Worcester Concerns Indicate That Transfer Men Can Study Problem of Motor Haulage with Satisfactory Results in Economy and Efficiency.

By C. A. French,

ONSIDERING the number of mechanical transports now being utilized in all kinds of commercial work, it is somewhat surprising to note that men engaged in the general transfer business apparently have not given the subject of motor haulage the attention that its importance deserves. George Wilmot of Worcester, Mass., a man who has been in the trucking business for over 40 years, and who may be assumed to understand some of the problems it presents, declares that the man who does not use motor trucks must get out of business. His statement has specific reference to his particular line.

Mr. Wilmot is senior member of the firm of Geo. D. Wilmot's Sons, 94 School street. His experience

with commercial motor vehicles dates back some 2.5 years, when a two-ton car was job rchased. The make of this first machine is not material. It may be stated that it is still in service in Worcester, although it was not sold to its present owner by the Wilmot concern.

"I have al-White 1500-Pound Wagon, I tilized by Gro. H. Wilmot's Sons, Worcester, Mass., in Plane ways said that it costs the first truck for experience," says Mr. Wil-

mot. "When we bought this car we were told that while it was a two-ton machine, we could carry three tons on it all right. That was not true. We tried it, and we know now that no two-ton truck ever should be expected to carry three tons. We know more about trucks today than we did then.

"We knew so little about trucks at the time that we employed a chauffeur, who considered he had done his full duty when he drove the machine as fast as it would run. I don't believe he gave any consideration to the matter of oiling, or tightened a nut or a bolt, as long as we had it-18 months. That it failed to do its work successfully, certainly was no fault of the truck. but I'm sorry for the man who owns it now, and I'm

glad he hasn't had our experience with it."

This appears to be a very frank statement, and undoubtedly it explains in a measure the reason some transfer men have abandoned the motor vehicle after a brief trial, and why still others have never given the subject careful consideration. Perhaps the surprising feature of this situation lies in the fact that Geo. D. Wilmor's Sons was able to understand the difference between use and abuse.

For the past year the concern has employed a 1500pound White wagon, made by the White Company, Cleveland, O. It was purchased for piano work and it is kept busy in such haulage practically all of the time. Once in a while it carries a light load of furni-

> ture, and some of these trips have been out of town, as far as Springfield, a distance of 50 miles. The results obtained on these out-oftown trips have been such as to warrant the company in ordering a threeton White truck for use in moving work exclusively.

"Five years from today," declares Mr. Wilmot, "the man who is moving anywhere within a radius of 100 miles will consider nothing but a motor truck. It not only gives him better service, but does the work in less time and at a saving in money. Our charge for moving work is \$1 a mile, one way. That would make the Springfield job come to \$50. It would cost a man \$75 by railroad and the same by team. In the former instance he would be four or five days without his goods and in the latter, at least two. With the motor truck he could cook his breakfast on his own kitchen range in Worcester and cook his supper on the same range in Springfield. Add the hotel bills to the haulage charges I have mentioned and you will be able to get some idea of the saving in expense. The only way to escape this extra expense is by imposing on the generosity of friends at one end of the line or the other,"

That Mr. Wilmot's figures are by no means excessive is borne out by his further statement that his firm recently undertook a contract for removing goods from Worcester to Jacksonville, Fla. Of course, everything in the house had to be packed and crated to withstand the journey by rail and boat. Two men were employed seven days in this work alone, and at a cost of \$240. This expense would have been eliminated entirely by loading the goods directly onto the motor truck, and there would have been absolutely an danger of breakage.

But to return to the 1800-pound piano wagon: It has averaged 40 miles a day, and the average gasoline consumption has been 18 miles to the gallon. It has been oiled every morning. The tires have given an average of 500 miles to a set, these being pinermatics, as is necessary in carrying pianos. The present chanffeur has a different concentration of his responsibilities



Atherton Furniture Company's 1.5-Ton White Truck Delivering Goods in Suburbs of Worcester, Mass.

and has cared for the truck in a manner which has called for no expense for repairs, worthy of mention.

In the piano work one gang of four men is able to do the work for which two gangs, or eight men and four horses, were employed formerly. On the out-oftown trips it has done the work of six horses. The saving in expense has been such that the truck has earned from \$30 to \$40 a day, "hots of days," according to Mr. Wilmo.

In deciding upon the purchase of an additional truck for hanling furniture, the Wilmot concern was influenced largely by the experience of the Atherton Furniture Company. From street, Worcester, with a 1,5-ton White, which has been in service for over a year. This vehicle is utilized in making deliveries from the furniture store to a large number of suburban towns and about the city as occasion requires.

According to Mr. Fowler of the Atherton company, this White car covered 14,000 miles last year, on a gasoline consumption of 10 miles to the gallon. It is shod with Morgan & Wright pneumatic tires, single in front and dual in the rear, and these have averaged 4000 miles to the set. It has replaced two two-horse teams in the work for which it was purchased. The company is 50 well pleased with the service given by it that a second White of 1500 pounds capacity has been purchased.

While exact figures are not available in either case, a comparative estimate of the cost of these two vehicles, with the horses they are able to replace, is shown in accompanying tables. These figures are based upon the statements of Mr. Wilmot and Mr. Fowler as to what the respective items have cost. In the matter of driver's salary it is placed at \$12 a week for the horse drawn equipment and \$15 for the trucks, and these should be understood as in the abstract, neither Mr. Wilmot nor Mr. Fowler caring to make public the amount of salary paid. It is assumed however, that the truck operator would be paid something more than the horse driver, since it has been proven, in

the Wilmot case, at least, that it pays to secure a man with the proper qualifications, and to offer sufficient inducement with that object in view.

It has been mentioned that Mr. Wilmot has been in the trucking business for over 40 years and his statement that it costs about 60 cents a day to feed, bed and care for one horse will be accepted as correct. The other items in the horse equipment table are based upon similar statements by Mr. Wilmot and others in Worcester, who have kept careful record of their horse costs in such work.

In the case of the L5-ton truck, it should be remembered that the tires were pneumatics, and the cost a mile would be lower proportionately with solid equipment, such as probably will be employed on the three-ton White purchased by the Wilmot concern. If the pneumatics will show a saving of practically \$300 a year over horses, there can be little doubt as to the economy afforded, particularly under what may be regarded as more favorable conditions. That there is efficiency has been demonstrated beyond question.

Mr. Wilmot says that with the 1500-pound wagon on gang of four men does the work of eight. This appears to give an increase of 100 per cent, in efficiency, Mr. Fowler says the L5-ton truck does the work of two two-horse teams and it must be presumed that this ratio would hold good with reference to moving work, particularly as he declares the efficiency of the vehicle could be increased still further were it possible to devise some means of quick loading, a problem for which present conditions at the loading platform at the store do not afford a satisfactory solution.

As far as the smaller car is concerned, the figures leave little room for argument. The estimate, based upon Mr. Wilmot's figures, shows a saving of nearly \$1000 a year in operating the equipment. To this may be added the wages of three extra helpers tome member of the second gang of workmen having been cared for by the item covering drivers), a matter of another \$1500 at least. Mr. Wilmot claims a profit of \$30 to \$40 a day.

If it be assumed that the L5-ton vehicle also represents an efficiency of 100 per cent, in this work, then the \$150 may be added to the saving on that installation as well. There is small wonder that the Wilmot concern has decided upon the purchase of an additional White machine. It ought to make a much better-showing than that of the Arberton company, particularly as the vehicle is to be operated largely on long distance hanks, where frequent stops will not cut down the gasoline consumption or the tire mileage. The experiences of these two concerns would seem to

FACTOR IN FARM LIFE.

Packard Motor Trucks Bring Produce to Market and Will Reduce Living Cost.

The Packard Motor Car Company, Detroit, maker of Packard trucks, has sold through its New York branch a number of such vehicles to farm owners in the region immediately surrounding the Meteropois. They are hauling everything required for farm use in the way of raw materials, fertilizers, etc., including coal and other commodities, and in their trips to the city markets or railroad stations are transporting every variety of farm produce, from barrels of apples to loads of hay.

At the famous Arcadia farms in Duchess county, New York, one Packard truck is doing the work of from eight to 12 horses. One man can drive the truck, but it would take two, four or six to drive the horses. The mechanical transport is expected to be one of the great factors of the future in reducing the cost of living. The ability of the man who grows fresh vegetables and other produce near the large cities to get his product to the market in one-fourth or one-fifth the time required by horses and at a saving usually from 30 to 50 per cent, in the cost of transportation, will result in increased production with a corresponding decrease in cost.

ONE-TON TRUCKS EXCLUSIVELY.

Federal Company of Detroit Rated as Largest Maker of This Type in the World.

It is maintained by the Federal Motor Truck Company, Detroit, that at is the largest exclusive maker of one-ton trucks in the world. Inasmuch as this is held to be an age of specialties and specialists, the indicate that there is much reason for giving the subject thorough consideration on the part of those engaged in the general transfer business.

thank (oat of Two Two-Horse Wagons,
Feed, etc., % 60c a day a horse \$876.00
Two drivers, &r \$12 a week each 1248,00
Depreciation, horses, 20% on \$1300, 260,00
Depreciation, wagons, 20% on \$800, 160.00
Depreciation, harnesses, 20% on \$140 28.00
Interest, 6% on \$2240 134.40
Total for horses
Annal Cost of 1500-Pound White Wagon.
Gasoline and oil \$101.40
Driver, & \$15 a week
Tires 250.00
Depreciation, 20% on \$2250,
Interest, 6% on \$2250
Total for 1500-pound White
Annal Cost of 1.5-Ton White Truck.
Gasoline and oil \$178,40
Tires 675.00
Driver, 6 \$15 n week 780.00
Depreciation, 20% on \$3000,
Interest, 6% on \$3000 180,00
Total for 1.5-ton White \$2413.40
Balance in favor of 1500-pound White
Balance in favor of 1.5-ton White \$293,00

Federal company naturally takes much pride in this rating, and the idea is carried out in every department. Constructing but one model, the company claims that it is thus possible to produce a fully guaranteed vehicle at a low price.

The Federal is built in two sizes, model C having 110-inch wheelbase and model D 114. The former is equipped with bodies designed for conveying small articles of heavy weight and the latter for carrying large bulky loads, such as furniture, etc.

These vehicles are now represented in over 100 different lines of business and are giving satisfaction in every detail. These lines also include chassis fitted with motor bus bodies, and the new combination chemical and hose wagon for fire department service. During the past two years Federals have been distributed widely throughout the United States and a great many have been shipped to foreign countries. The output for 1912 will be over 1000 cars, and the orders and repeat orders for the coming season indicate that between 2000 and 2500 will be needed to supply the demand in 1913.

Peerless in Express Business—The American Express Company, which has over 20 Peerless motor trucks, made by the Peerless Motor Car Company, Cleveland, O., in use in various parts of the country, has recently purchased seven additional three-ton Peerless vehicles to be used at Cleveland. Three of these have already been delivered and for the past few weeks have been collecting freight packages throughout the city and carrying them to and from trains. In a short time the Cleveland traffic of the American Express Company will be completely motorized. Over a year ago the company, which is one of the largest users of motor trucks in the country, tried out a few Peerless trucks and since then has ordered others at short intervals.



AINTS·FOR·PROPER MAINTENANCE

A Department for the Owner, Driver and Repairman.



GAS TANK RACKS.

Service stations and garages make it a practise to carry a number of gas tanks for the benefit of their customers. In the larger stations the tanks are kept in the storeroom under lock and key, but in some garages they are placed in the office for safe keeping.

An easily made and inexpensive rack for storing tanks is depicted at Fig. 2 and it may be located at any convenient place. It is constructed of wood and the inside dimensions of the shelves are two feet, six inches long, nine inches high and eight wide. These dimensions will accommodate the largest sized tank.

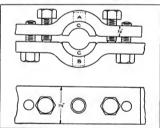


Fig. 1-Grinding Tool for Crankplus and Wristplus Where Grinder is Not Available.

The number of shelves will depend upon the number

of tanks to be stored.

The shelves should be given a slight pitch, about 5-inch higher in front than at the rear to retain the tanks, and when the rack is built against the wall the rear partition may be eliminated. If desired a door may be fitted and provided with a lock

GRINDER FOR WRISTPINS.

In fitting a new wristpin to a piston and when the former must be made and hardened, it is likely to become warped in the process. Ordinarily a grinder would be employed to correct any misalignment, but when such is not available the work may be performed

by means of a home made grinding clamp, as shown at Fig. 1.

The clamp is made easily by bending two plates of iron as illustrated in the drawing. It is fitted with four screws, two of which are employed to hold it apart and the other two together, thus enabling the adjustment of the halves to the diameter of the work being ground, and yet rigidly with regard to each other.

The two metal laps C are made as follows: The clamp is laid on its side on a flat surface on which is spread a thin layer of putty to prevent leakage of the motten metal. The spindle to be ground is held in the centre of the opening, the gaps and ends of the hole stopped with putty, and molten type metal, lead or tin, is poured in the remaining space. The holes A and B being countersunk prevent the laps falling out of the clamp, as the metal running into these forms plugs with enlarged ends. The clamp can be used on work running in the lattle, or as in the case of crankpins, rotated by hand. Oil and enery are used as an abrasive.

IIG FOR FILING WASHERS.

Many times washers are employed to take up lost motion and as a rule the stock washer is either too thick or too thin for the purpose. Reducing these members by filing is not only difficult, but it is hard work to hold them in the vise, as well as to file them

At Fig. 3 B is shown a simple method of accomplishing the work. As will be noted the washer is imbedded in a block of wood, taking care to have at least half of the washer above the surface of the holder as shown at C. It is then an easy matter to place the work in the view and file the washer evenly.

HOME MADE TAP WRENCH.

In the care of the truck the driver who undertakes his own repairs is called upon to perform work that requires special tools, such as a tap. Although a monkey wrench may be utilized with this tool, it is poor practise, as the pressure applied is uneven and the tap is likely to be broken.

If the garage is not equipped with a tap wrench

one may be constructed easily and at a slight expense. At Fig. 3 A is shown a home made device the material for which comprises two strips of iron or steel,

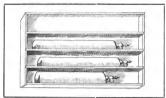


Fig. 2-Ensity Made and Inexpensive Back for Singing Gan

four or five inches long, .25 thick and .375 inch wide. A recess is cut in either piece, as illustrated in the sketch, for the purpose of securing the head of the tap. The pieces are locked by means of set serves or bolts as indicated. The servess may be of any convenient length in order to allow the use of different sized taps.

AUTOMATIC VALVE GRINDER.

Considerable progress has been made in the construction of machinery for replacing work on the motor ear formerly accomplished by hand. As valves require periodical grinding, more or less time is consumed in the operation, this depending upon the condition of these members. In grinding valves it is essential that the tod be rotated in one direction and reversed from time to time, also lifted so as to prevent the abrasive material bunching up and scoring the valve and its seat. It is likewise important that the pressure applied to the tod be slight but constant.

The Specialty Machine Company, 95 Liberty street, New York City, has brought out an automatic valve grinder which is claimed to perform the work as successfully as by hand and in much faster time. As will be noted by the illustrations presented at Fig. 6, the device is similar to a breast drill in construction. It comprises a frame having an oscillating arm, a bevel pinion, a driving rod for the valve and two plain gears with a turning crank. Other components of the tool consist of a cam, a roller, a clutch and a spring.

The tool is operated as follows: When the turning handle A is rotated, the crank B rotates in the slot C, imparting a reciprocal motion to the arm and segment D, which reciprocates the small pinion E. The crank I transmits this motion to the driving spindle II. The gear G is driven by the small pinion K. Located on the inside of the large gear is a cam which periodically comes under a roller mounted on the carrier L, and lifts the clutch from engagement, holding it until the pinion E has rotated through a given arc, whereupon the cam drops the clutch back into engagement. The

movement also lifts the valve from its seat. The spring M is employed to insure the engagement of the clutch at the proper time and to provide a constant pressure. The nut R locks the valve on the rod H. The weight of the tool and operator's pressure is carried on the shoulder N and the valve opening on the motor.

The cycle of operations is said to be so continuous that the valve is ground evently, and seated accurately. First the valve is reciprocated on its seat for a number of times, is then lifted and released by the cam, and automatically placed in a different angular position on the seat, next automatically moved forward through a given angle and then reciprocated as before. The pressure between the valve and its seat is held constant and controlled by a spring of uniform pressure, and the compression of this spring M varies in accordance with the size of the valve and the design of motor. The automatic valve grinder is constructed of high grade material and is moderately priced.

SCREW CUTTING DIES AND HOLDERS.

Screw cutting dies and holders form a valuable addition to the tool equipment of the repair shop. The Remington Tool & Machine Company, Boston, is manufacturing a screw cutting die which is constructed in two parts, with a heavy rigid hinge formed integral with one side, the construction being shown at Fig. 4 B and C, respectively. A tager hole at the top of the die provides for the reception of the tapered point of the adjusting screw in the elastic die holder D. Adjustment for expanding or contracting the die is thus accomplished without removal from the holder. The hinge and taper point form practically a solid die,

A quality claimed of the tool is that it is instantly accessible for sharpening, there being ample clearance

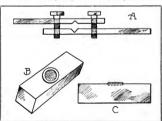


Fig. 5.—Suggestions for the Driver-Repairmant A. Home Wade Tap Wreacht B. Method of Retaining Metal Washers When Filling is to Be Done; C. Showing How Washer is Imbedded in Wooden Block.

for an emery wheel or lapping with diamond powder. Another feature emphasized is that in the event of particles of metal lodging between the teeth of the die

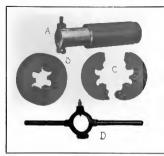


Fig. 4.—Remington Seren Culling Dies und Holderst A, Tool Employed with Lather B, Adjustable Dier C, Showing Construction of Hinged Dier D, Einstie Die Holder

they may be removed easily. Efficiency is secured through accurate alignment by means of the sharp cutting teeth and the maker states that a single cut makes a perfect thread. It is also claimed that the die may be resharpened as long as any appreciable portion of the teeth remains.

For bench work the die can be used in holders of the ordinary pattern, but the elastic die holder shown at D is recommended. For machine work the holder illustrated at A is employed.

CAUSE OF NOISY BRAKE.

The driver of a delivery car noted that the foot brake located on the rear of the trausmission chattered each time the member was utilized. Several remedies, were tried without success. Finally it was discovered that the drum was boose on the shaft. The end of the latter was a straight square and the drum was fitted loosely. The trouble was eliminated by placing four steel strips, 505 inch thick, one on each face of the square, and pressing the drum over them.

CORRESPONDENCE

Mensuring Pitch of Genra.

(16)—Kindly inform me how to measure the plich of a gear.

Brookish, N. Y., Oct. 5.

In the sizing and cutting of gear wheels the terms diametrical and circular pitch are used. Diameter, when applied to gears, is always understood to mean the pitch diameter. The diametrical pitch is the number of teeth to each inch of the pitch diameter. For example: In diametrical pitch if a gear has 40 teeth and the pitch diameter is four inches, there are 10 teeth to each inch of the pitch diameter and the diametral pitch is 10, or to express it in other words, the gear is 10 diametral pitch.

Circular pitch is the distance from the centre of one tooth to the centre of the next, measured along the pitch line. For example: If the distance from the centre of one tooth to the centre of the next is .5 inch, the gear is .5-inch circular pitch.

If the diametral pitch is required and circular pitch is given, divide 3.1416 by the circular pitch. If the latter is desired and the diametral pitch is given, divide it by 3.1416. The number of teeth required may be obtained by multiplying the pitch diameter by the diametral pitch when these are given. When the outside diameter and diametral pitch are known and number of teeth required is desired, multiply the outside diameter by the diametral pitch and subtract two. The pitch diameter may be obtained when the number of teeth and diametral pitch are known by dividing the number of teeth by the diametral pitch.

The thickness of the tooth at the pitch line may be obtained by dividing the circular pitch by two, or 1.57 by the diametral pitch. The whole depth of the tooth required may be secured by dividing 2.157 by the diametral pitch.

The Brown & Sharpe Manufacturing Company, Providence, R. L., produces steel rules for sizing wheels, and the instruments are so calibrated that measuring is an easy matter.

lieverner for Motor.

The usual method of governing is by reducing the amount of vapor to the cylinders; that is, obstructing the inlet pipe. This may be accomplished by fitting a butterfly valve or rotating plug valve in the pipe, this

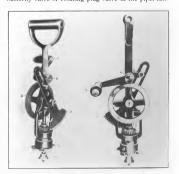


Fig. 5.—The Automatic Unive Grinder Imparting Reciprocal Movement to Valve as Well as Lifting Latter from its Scal.

Dig and by Google

being actuated directly from the governor. At Fig. 6 is shown a centrifugal governor and two methods of application.

At A is depicted a method of controlling the supply of mixture to the motor. In this a is the half-time or two-to-one shaft of the engine, and mounted upon it is the gear wheel b, which consequently revolves with it. The governing weights o o are attached to the wheel by arms which move freely on studs, and the former have continuations h h at right angles. The ends of these arms bear against the sleeve c, which slides freely upon the shaft a when pressure is applied, but which is normally pushed against the arms h h, by the spring s. A spring p connects the weights, and tends to draw these toward each other. In the chamber or pipe v is a butterfly throttle valve which governs the admission of mixture to the combustion chamber, and the object of this governor is to control this valve, which is accomplished in the following way: of slowing the engine, and the throttle opens again, either partially or wholly, according to the movement of the accelerator.

The drawing shows the general principle upon which the centrifugal force is conveyed from the governing weights to the throttle valve. The arms push the sleeve c, the latter actuates the fork on a rod which is pivoted. At B is presented the butterfly throttle valve, the dotted lines depicting the valve closed and the relative position of the actuating level.

A method of employing the governor with the rod leading from the lever attached to the throttle of the carburetor is illustrated at C. Here the rod leading from the hand throttle is equipped with a forked member, fitting over another rod which is threaded to take two muts, these being for the purpose of adjusting the lead and retaining the fork. This is shown at D, which sketch also shows the method of fitting the rod leading from the governor. The former is held by a threaded

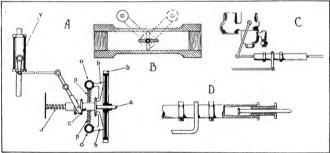


Fig. 6—Suggestion for installing a Governor: A. Method of incorporating Valve in Intake Piper B. Construction of Butterfly Valves C. Connections to Carbaretor: D. Adjustable Rod Device.

The spring s is so adjusted as to hold the sleeve c against the arms h h until the engine attains a predetermined number of revolutions, while, by means of an accelerator in the form of a hand or foot lever, the spring s can be assisted to hold back the sleeve c. When this sleeve is held against the arms, the governor does not come into action, and the throttle remains fully open. When the motor is started the gear wheel b, and with it the weights o o, revolves, and centrifugal force tends to cause the latter to fly outward, a tendency which is resisted by the spring p. As the number of revolutions of the motor increases, the centrifugal force overcomes the resistance of the spring p, the weights fly out, and the arms press against the sleeve c. A further increase of speed creates additional centrifugal force which, at a certain point, overcomes the resistance of the spring, the sleeve moves along the shaft a, and the throttle begins to close, reducing the charge in the cylinders. This has the effect

adjustable member through which it moves freely.

When the governor is in action the rod attached to it moves until the headed portion makes contact with the threaded member and a further movement of the sleeve on the governor actuates both rods and closes the throttle. The latter is fitted with a spring for the purpose of opening when the speed of the motor decreases and the sleeve of the governor returns to normal position. The fork attached to the hand throttle permits of regulating the opening of the carburctor in the usual manner. The action of the governor rod may be regulated by the threaded member by lengthening or shortening as the case may require.

The mirrors or reflectors of the headlights will become dirty, especially if mot protected by coverings. Ordinarily the deposits may be removed by using tissue paper. If not, a little warm water, soap and a soft cloth will accomplish the work successfully.

FOREIGN TRUCK NOTES OF INTEREST

MOTOR TRUCKS IN IRELAND.

Road Conditions Are Held to Be Ideal for Their Use

Although there are upwards of 9000 automobiles in unfailed the manufacture of them there is confined at present to a single factory, located at Belfast. However, an additional plant is to be built at Dublin in the near future.

Ireland's business frms make use a of great number of commercial vehicles. This is highly practicable, for the reason that of the country's 54,000 miles of public highways, at least 50,000 miles are in splendid condition for traffic and the country councils are daily making them better by the use of the steam roller. Ire-

most consistent demand for facts and figures concerning the comparative cost of horses and motors. In this respect, British manufacturers are in a somewhat better position to give adequate information, for although tracks have not yet come into as general use abroad, they have been employed in certain lines for a much longer period than in this country.

J. & E. Hall, Ltd., Dartford, Kent, maker of Hallford vehicles, is a pioneer manufacturer of mechanical transports, having been established in IP85 and for a number of years in the very front rank among British engineers. The two-ton wagon presented herewith, represents the latest development along this line, but ears of this capacity have been in service in various sections of the British Isles and in the Colonial possessions for a number of years. Reliable figures.



Two-Ton Hallford Chassis of Beltish Manufacture, Fitted with General Service Wagon Body,

land is today an ideal country for the carrying on of motor traffic,

The fire brigades of Belfast and Dublin have fallen in with the progressive idea. The type of motor fire engine used in both cities is identical, and very soon Cork and Londonderry also will have their motor fire brigades.

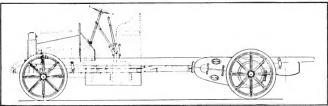
HALLFORD TWO-TON WAGON.

Type of Vehicle Which Has Demonstrated Its Economy in Commercial Service in England.

Since the commercial interests in Great Britain have been turning their attention to the subject of motor hanlage, in a manner more nearly approaching the study of the problem in America, there has been a therefore, are available, from which it is possible to secure complete and accurate data.

In the first place, it should be stated that the Hallford two-ton wagon is fitted with a 25 horsepower, four-cylinder motor, with crankease of aluminum. Inlet and exhaust valves are made from nickel steel. The tuning gears are entirely enclosed in the oil chamber, Iguition is by Bosch high-tension magneto. Cooling is by water, circulation being maintained by a pump. Power is transmitted by a special form of friction clutch to the four-speed transmission and differential, final drive being by chain.

Two sets of brakes are fitted, one acting on a drum on the gear shaft, and the other on druns in the rear wheel linbs. The frame is of pressed nickel steel. Springs are long and of special resiliency. Wheels are of cast steel, mounted on ball or roller bearings, and



Nide Elevation of Hallford Two-Ton Chassis, Indicating Location of Motor and More Important Components.

the tires are guaranteed for 10,000 miles by their maker

Translated into American money, the experience of these vehicles in service, indicates the following as an annual average comparison between them and horse drawn equipment, covering a service of 80 miles a day for 300 days:

Annual Cost of Four Two-Horse Ten	ma.
Four teamsters & 28s a week	1362,62
Food and hedding to (40 a year	1557.28
Shoeing & 13 a year	116.83
Veterinary's charges & Il 10s a horse.	58,40
Rent w 7s 6d a week a learn	379.58
Maintenance, wagons and harnesses	97.23
Depreciation, burses, wagons and barnesses to	
154,	467.18
Interest on Investment 9 55	155.72

Annual Cost of	Hallford	Two-Ton	Wagon.
Driver w 35s a week			\$425.51
Tires % 2d a mile			973.30
Gasoline to 9d a gatlon.			545.00
Lubricants			N7.59
Maintenance, chassis 9 12	.511	ale a star	252.84
Maintenance, body, & 10%			14,60
Depreciation, chassis and			
Storage to be a week			63.26
Interest on investment a	B**		128.56

HI-14-MI	0,1	ne serin	.,,,				120,20	
Total	for	truck				 		2812.50
Bala	nee I	n favor	of	met	01			\$13×2.45

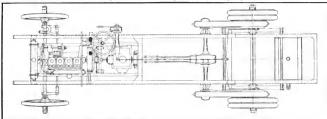
In considering these figures it should be remembered that the cost for labor and some other items is not as much in England as in America. On the other hand the price of gasoline, for instance, is more than on this side. While it will be impossible to make American conditions conform exactly to those represented by the above table, it should prove of decided value in determining the economy to be effected by motor trucks.

OPPORTUNITY IN CHINA.

Reports from New Republic Indicate Possibilities Are Good If Properly Followed Up.

From recent reports there appears to be an excellent field in China for the introduction of motor commercial vehicles. The country thus far has been decidedly slow in adopting this modern form of transportation, although it is stated that two firms have placed motor wagons on the roads in and about Shanghai. The Aerated Water Factory of Shanghai will soon possess a motor delivery truck, with which it hopes to transport a large supply of goods a considerable distance into the country.

Many Chinese merchants have had the advantage of motor trucks brought to their attention, but few have seen fit to place orders. It is the opinion of those on the ground that if firms in the automobile business were to approach several of the larger concerns having export departments they may find business possible by such Chinese connection. The merchants of the Celestial empire desire particularly to be informed upon the cost and upkeep of motor vehicles.



Pinn View of Uniford Two-Ton Chasals, Presenting Simplicity of Design and Accessibility of Components.

KING GEORGE APPROVES MOTORS.

British Ruler Very Favorably Impressed by Results Obtained in Recent Army Manoeuvres.

The British army manoeuvres have been concluded and King George, in reviewing the events, places stress upon the value of the motor truck in army work. While this is not the first year that the motor vehicle has played a part in military trials, nevertheless the demonstrations this year have proved a revelation of its worth and has led to its adoption as a permanent means of transporting troops and baggage. The use of these vehicles was greatly opposed by a certain faction of the military authorities, which held that they were impracticable. However, motor trucks were used extensively in an effort to establish their real worth for such service. The success of the great fleet of machines of all makes and types was gratifying and the war department will set about securing automobiles amply sufficient for its use in the future,

cared for by the mechanics which accompanied the fleet with a complete machine shop on wheels.

TRUCKS WITH AERIAL ARMADA.

French Army Vehicles Play Important Part in Success Achieved by Aeroplane Corps.

The recent formal review of an aeroplane armada by Alexander Millerand. French minister of war, at Villacoublay, France, when no less than 72 French army aeroplanes, with their full complement of pilots and observers, and their attendant park of motor trucks carrying supplies and equipment, proves of historic interest. It was the first time that the armed aerial force of any nation had been assembled under like conditions, and at its conclusion 20 of the aeroplanes arose in a "flock," entireled the parade ground for a few minutes and flew away to the eastward to resume their stations on the German frontier.

An accompanying illustration shows a portion of



Park of Motor Trucks Attached to the French Army's Aeroplane Armada, at Recent Review in Villacoublay.

In the past it has been necessary for the army officers to plan their movements carefully and with precision as it was not possible to get too far a head of the supplies. This year this was different and the infantry movements were made possible at a considerable distance from the base of supplies, owing to the ability of the trucks to transport necessities at a greater distance and more quickly. In this year's manoeuvres the army was forced to move faster and camp stores and equipment were of necessity moved from place to place, but this work was accomplished with more readiness than would have been deemed possible in former years.

This method placed a severe test on the transport fleet, but their successful effort was of great advantage to the manoeuvers which thus had a wider latitude than would have been possible under the old arrangements. Supplies, which with horse draw vehicles arrived at camp in poor condition, were delivered quickly and in an excellent and healthful state. Accidents were minimized, the one or two mishaps being quickly the motor trucks employed by the French army as attendants for the aerial corps. The method of transporting the aeroplanes on trailers behind the trucks is indicated, and it may be added that the supplies and necessary equipment are carried within the enclosed bodies of the vehicles. France has developed this feature of modern varfare somewhat further than most nations, and the picture herewith has a significant bearing upon the present situation in Continental Eutope.

INDIA WANTS MOTOR 'BUSES.

Engineering Publication Advocates Their Adoption in Place of Tramcars for Passenger Transportation.

Indian Engineering, a publication issued at Calcutta, India, makes some interesting observations relative to the inture development of that city, as well as Delhi and other places. Considering an address made to the Tramways & Light Railways Association in England by Engineer Pott of the Metropolitan Electric Tramways Company, it suggests that motor passenger vehicles be installed in preference to any other form of transportation.

It states that Calcutta and other places will soon be called upon to decide which form of transportation it will have upon the new roads that will be opened both within the existing limits of the city and proposed extensions. It cites the fact that motor 'buses are cheaper in first cost than tramears and urges their purchase on the grounds that their advantage will be greater with each improvement in design and development.

TRAVELLING MAIL BOX.

England Trying Out New and Novel Method of Posting Letters on Motor 'Bus.

The motor car has again demonstrated its usefulness as a speedy carrier and the residents of Ombersley, England, are now getting their mail at regular intervals by means of a motor bus, which has been equipped with a letter box in which mail matter can be posted by any person along the route to Worcester. Previously it was necessary to send mail by a somewhat circuitous route through Droitwich.

Residents complained of the slow service given to them, when it was suggested that a box be placed on the horse drawn 'bus which then served the locality five times daily. This has since been superseided by the faster motor vehicle and mail is now swiftly carried between those points. The Worcester postal officials have the key to the box and upon the arrival of the 'bus it is cleared of all mail, which is then delivered to its destination.

GENERAL NEWS FROM ABROAD.

Transporting Beef in South America—Several South American beef concerns have placed motor trucks in commission and the matter of greatly extending the service is being considered seriously. It is understood that numerous trucks are to be added in order to carry large quantities of beef from the slanghter houses directly to the dock of shipment.

King Alphonso and Spanish Show—It is announced that next year's international exhibition at Barcelona, Spain, will be opened officially by King Alphonso in January and will remain open until April. Arrangements have been made with the customs department so that all exhibits will be admitted free of duty. Continental manufacturers have already responded freely to the appeal, particularly in Germany, and many British firms have made arrangements for allotments of space. Nearly all makes of motor vehicles will be represented at the exhibition. The AngloInternational Permanent Exhibitions, Ltd., London, possesses full information of the coming show.

Agricultural Test in South Africa—The Port Elizabeth Agricultural Society, Port Elizabeth, South Africa, has decided to offer a prize of about \$700 for the best motor tractor shown at work with disc or other plows, in a series of field trials which will be held early next April. Those interested can obtain information by writing to the secretary of the society at Port Elizabeth.

Olympia Show in July—The commercial vehicle committee of the British Manufacturers' association has finally selected July of next year for the holding of the 1913 industrial motor show at Olympia, London, England. This decision was made after full consideration of the dates upon which the building would be available. It is probable that the show will open the third Saturday of the month.

Want Delivery Cars in Australia—Melbourne and Sydney, Australia, are said to be poorly provided with parcels delivery systems and it is necessary for many large retail firms to maintain large fleets of vans, many motor trucks among them, to accomplish the delivery of small parcels. It is stated that if an enterprising firm of carriers desires to establish a carrier service system in either city, the business prospects would be excellent.

Subvention Trials in Germany—Sixteen truck manufacturing concerns will take part in the Prussian war office's annual run for the subvention placque, including the two new aspirants. Adderwerks and Genruder Stoewer. The Io also include two Bavarian houses, the trials for the Bavarian placque materializing simultaneously with those organized by the military staff at Berlin. Starting at the Prussian capitod the trucks and trailers will cover a circuit of 2034.6 kilometers in 22 working days, which means a daily average of 93.4 kilometers, or 38 miles. The rules governing the trials this year are more exhaustive and severe than ever before.

Show in German East Africa—A motor show is to be held at Sar-es-Salaam, German East Africa, in 1914, and the Colonial Economic Committee at Berlin, Germany, has decided to secure a large exhibition of German machines. Agrimotors, freight automobiles, crude oil engines and every kind of machine that will be useful in the development of the colony will be displaced.

Municipal Motors in Glasgow. The city of Glasgow, Scotland, which has already installed motor fire vehicles, motor prison truck and automobiles for the conveyance of the various officials of the city, has placed an order for a motor driven street sweeping machine, which will be put into service immediately.

THE A B C OF MOTOR CAR OPERATION.

Part III---Outlining the Various Systems Utilized with the Commercial Gasoline Vehicle,
Their Components and Application in Practise---Defining Conductors of
Electricity and Explaining the Theory of Induction.

By C. P. Shattuck.

TO OBTAIN efficiency as well as to climinate opportunities of trouble, a knowledge of conductors and insulators of electricity is essential. This is particularly true of the high-tension current which displays a wonderful avidity for returning to the "ground," or home, because of its extremely high voltage or pressure, a condition brought about by the induction coil, the construction and operation of which will be explained in logical sequence.

Conductors of electricity may be compared to a pipe conveying water from one vessel to another, the fluid representing the electricity and the pipe the insulator. When there is but little head or pressure of water the walls of the pipe may be constructed of thin material, but if the fluid is forced or pumped at a great pressure, the thickness of the tubing must be increased, else the pipe will burst and the water escape.

The primary or low-tension current, such as derived from dry cells or a storage battery, is similar to



Fig. 10—HuntraGing Canductors of Electricity Employed for Igaillon Purposes: A, H and C, High-Tension Cables; D and E, Primary Wirrs; F, Four-Strand Low-Tension Cable.

water flowing under slight pressure, while the secondary or high-tension electricity is analogous to the fluid being forced through the tubing. A simple explanation of the action of these currents is obtained by water flowing through a garden hose. If the faucet be opened but slightly the fluid will dribble out of the nozzle, but upon the pressure being augmented considerable strain is brought to bear upon the walls of the hose by the water seeking to escape. When the resistance of the nozzle is greater than the walls of the lose, the latter will burst and the water will leak to the ground.

Electrical Conductors.

Electricity is not conveyed through tubing, but through metal, which is an excellent conductor. All metals will conduct electricity, also well burned charcoal, plumbago, metallic ores, acid solutions, animal fluids, saline solutions, moist earth, water and living vegetable substances. It has been explained that the obm represents the unit by which the resistance to a current is measured. The conductivity and resistance of different metals vary considerably and the resistance increases with the temperature of the conductor. Next to silver, copper is the best conductor and annealing the metal decreases the resistance as well as renders the wire pliable. Because of the vibration set up by the automobile a single strand wire is not practical and a number of fine wires are employed, these varying from 20 to 42, according to the make of the cable.

Like the water in the hose pipe, the current must be prevented from flowing through other than the predetermined channels and to prevent the loss of electricity the fine strands of wire are covered with a nonconducting material, commonly called insulation. Insulators include dry air, shellac, rubber, glass, parafiin, porcelain, mica, fibre, ehomite, wax, resin, dry leather, oils, parchneut and silk.

Insulating Materials.

Rubber is an excellent non-conductor of electricity and with high grade ignition wiring the pure material is utilized, the strands of copper being covered with several layers of rubber. As rubber is affected by heat, oils and moisture, the final layer is covered with a linea braid or other similar material, impregnated with a special compound and heat treated. Some makers cost the outside jacket with a shellar preparation.

Wires utilized to convey primary and secondary currents are distinguished easily by their size, the former being small and varying from an .125 inch to .25 in diameter, while the high-tension cable is from .375 inch to .5 inch. Conventional types are illustrated at Fig. 10, the secondary cables being shown at A. B and C, while the primary wires are indicated at D. E and F.

It will be noted that the large cables are provided with four or five layers of rubber in addition to the cutside jacket, while the primary wires have but one or two coverings of insulating material. The construction is analogous to the garden hose, the high-tension cables being equipped with substantial walls to withstand the pressure of the high voltage current. As the smaller wires convey the low-tension current, or low pressure electricity, it is not necessary that the conductor or copper wires be so heavily insulated.

Function of Terminals.

Before describing the method of converting the primary into a high-tension current for the purpose of igniting the mixture in the cylinder of the internal combination motor, the terminals or connectors should be considered. It is poor practise to strip a wire or cable to expose the metal for the purpose of attaching the lead to the battery or spark plug as not only are the wires likely to break through vibration, but one or more of the strands may come in contact with other metal, creating a short circuit.

For the purpose of making connections between batteries or securing the leads to the coil, magneto or plugs, terminals or clips are employed, and there is a large variety of designs offered as will be noted by the devices illustrated at Fig. 11, which depicts conventional types. Those at B and C are employed for connecting dry cells in series or multiple as previously explained. When wires are led from the battery to the coil and to the frame for "grounding," the terminals shown at G and L are utilized. The insulation is removed from the end of the wire, which is inserted in the small opening and then soldered. This makes a solid connection, eliminating resistance, as well as preventing stray strands from creating short circuits. The short wings of the terminal are first clamped over the bare wire and the long wings bent over the insulated fibre sleeve, which when rotated contracts or expands the jaws as desired. High grade wiring and care in soldering are essential for successful operation of the ignition system.

Necessity of Induction Coil.

Before describing the building up of the low-tension current, it should be explained that the charge of combustible vapor in the cylinder of a motor is exploded by a spark. The flame is produced by the electricity jumping across the gap at the points of the plug and this opening is practically an air space. It has been explained that air is a non-conductor of electricity and consequently resists the current, the amount of resistance depending upon the width of the gap. The gap of the standard spark plug is .03125 inch and is practically a break in the circuit.

If a ring of metal is broken and the ends separated, a gap is obtained. If one end of the metal be touched to the positive terminal of a battery and the other extremity held within .03125 inch of a wire attached to the negative pole, current will not flow un-

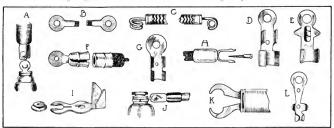


Fig. 11—Presenting Different Types of Terminais: II and C, linttery Connections and Terminais: G and L, Copper Primary Wire Terminais: D and E, Secondary Members; Λ, F, II, I, J and K. Detachable Types of Secondary Terminais Employed with Spark Plags.

portion, preventing its working back, which often causes the wire to break off at the terminal.

Types of Terminals.

The terminals shown at D and E are also of copper and are employed with secondary wires where the spark plug is fitted with a knurled nut for retaining the terminal, which is provided with an opening. The clip shown at I is employed in connection with a well known make of spark plug and may be employed with any type of plug as the device includes a small ringed member for service with the knurled nut type of plug. The terminal is fitted with jaws which slip over the ringed member, making it an easy matter to displace it when a spark plug has to be removed for inspection or for cleaning.

Another design is depicted at A, the head of the plug being equipped with a ball member over which the terminal slips. This type is also made with an adapter as shown at J. That at K differs from those described in that the gripping laws are actuated by a less of sufficient potential. But if the pressure of the current were augmented the electricity would jump across the gap, completing the circuit.

If one wire from a battery be attached to the shell or metal base of a spark plug, and the other lead of the battery secured to the terminal of the plug, current will not flow or bridge the gap because of the air space and low voltage of the battery, but if the pressure be increased to a predetermined amount by means of an induction coil, the current will jump the gap, creating a flame in the operation. This is known as the jump spark and the time of sparking is regulated by a component of the ignition system known as the timer or commutator, which is practically a switch, in that it opens and closes the primary circuit when the mixture in the cylinder is compressed and the piston is in the proper position for the firing stroke.

High-Tension Current.

The transforming of the low-tension or battery current into high-tension is by induction. Magnetism and electricity are closely allied and the link between these lies in the fact that magnetic lines of force are constantly passing from the south pole to the north, these

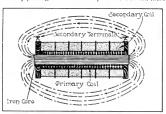


Fig. 12-Sectional View of an Induction Coll, Showing the Lines of Force.

returning to the south pole through the atmosphere, and circular magnetic lines of force surround a conductor through which an electric current is flowing. The space in which the magnetic lines of force are active is called the magnetic field.

Theory of Induction.

If a length of insulated wire be wound into a coil and a current passed through it, the magnetic lines of force which surround the wire will travel in one general direction on the inside of the coil and in the opposite direction on the outside, as illustrated a Fig. 12. If two coils of insulated wire be placed in proximity to each other, one inside the other, and the ends of inside coil connected with a source of electricity, the current passing through that coil will induce electricity to flow through the second coil, the intensity of which is the

greatest when the circuit of the first is quickly broken.

When the first coil is converted into an electro-magnet by placing within it a core of soft iron the strength of the current is further augmented, depending upon the number of turns in the respective coils. The coil through which the current passes positively is composed of coarse wire and is called the primary, while that in which it is induced is known as the secondary.

At Fig. 13 is presented a simple demonstration of the induced current. It will be noted that the leads from the dry cells are connected to a primary coil comprising coils of coarse wire wound around a soft iron core and so con-

structed that it may be inserted and removed from the secondary coil, which is composed of a number of fine wires as previously explained. The ends or leads from the secondary circuit are connected to a current indicator.

Flow of Current.

When the primary coil or core is inserted, the current flows in one direction, and when withdrawn it flows in the opposite direction. This production of current is shown by the movement of the indicating needle of the measuring instrument. The intensity of the current is not only dependent upon the number of turns of wire, but upon the rapidity with which the core member is inserted and withdrawn from the secondary coil. It would not be practical, however, to utilize such an arrangement for igniting the explosive vapor in the cylinder of the gasoline motor, and instead the coil is provided with a vibrator operated by the magnetism of the core, which interrupts the primary current. This making and breaking of the primary circuit is productive of a very high electromotive force in the secondary winding, which is necessary to force the current to bridge the gap at the plug.

Why High Voltage Is Required.

It requires about 10,000 volts to force an electric current to cross an air gap of .0625 inch and as the spark coils utilized in connection with ignition systems for motor car service are capable of jumping a spark across a space of from .375 to .75 inch, it is obvious that they must be productive of electrical pressures of from 50,000 to 100,000 volts. This voltage is secured from dry cells or a storage battery registering approximately six volts. Although the voltage appears extremely high it must be remembered that the amperage is proportionately low and that a small amount is lost in the coil.

(To Be Continued.)

Ed. Note—The next installment will deal with the components of the induction coil, explaining the con-

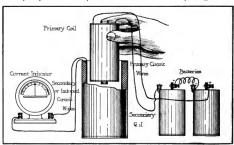


Fig. 13—Illustrating the Principles of an Induction Coll, Shawing the Primary and Secondary Sources of Current and Measuring Instrument in Indicate When Induction Takes Place.

struction and operation of the condenser, also outlining the different types of timers and distributors of the high-tension current.

New @mmercial @r/cessories.

Rexo Electric Horn.

To meet the demand, for a low priced, high grade electric horn, the Dean Blectric Company, Elyria, O., has brought out a new type called the Rexo. It is operated by any six-volt battery and the same material and workmanship are employed as with the other types made by the company. It is economical of current, requiring less than 1.8 amperes and the maker points out that it does not require adjustment or attention after being assembled at the factory. It gives a clear, penetrating signal, operated by the pushing of a button conveniently located.

Gemco Emergency Grip.

The Garage Equipment Manufacturing Company, Milwaukee, Wis, is marketing an emergency grip device for truck tires. It is designed to be employed separately from others of the set and may be placed at any point on the wheel between the spokes, and as many may be utilized as convenient. The chain is held over the tread by the two side bars, which are clamped together by means of a bolt located under the felloe.

Baldwin Chains.

Chains are an important factor in the economical operation of commercial vehicles, and as these members are exposed to the elements and subjected to heavy stresses it is important that they be constructed of high grade material and accurately designed. The Baldwin Chain & Manufacturing Company, Worcester, Mass., produces a large variety of chains for all types of motor cars and the product of this concern is well and favorably known among truck builders.

The company also manufactures light chains for driving magnetos, pumps, etc.

Holt & Beebee Electric Tail Light.

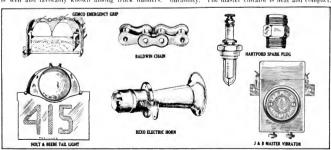
Electric tail lights are favored on commercial cars of the delivery type as they add to the appearance of the vehicle. Holt & Beebee, Boston, is manufacturing a high grade electric tail light which not only serves as a rear signal, but illuminates the license tag. The red semaphore is mounted above the number upon which is thrown a white light. The light is operated by a six-volt battery, is sturdily constructed and inexpensive.

Hartford Spark Plug.

The Hartford Suspension Company, Jersey City, N. J., is maketing a two-piece spark plug, a design making for easy cleaning qualities. Its lower part is screwed into the cylinder head while the upper portion is removable. The plug is simple in design, and the parts so constructed that they may be separated easily. It is gas tight and the company points out that it cannot rust or freeze. It is constructed of high grade material and is moderately priced.

J. & B. Master Vibrator.

Among the qualities of a master vibrator is that it synchronizes the spark when a high-tension coil and hatteries are employed. The J. & B. Manufacturing Company, Pittsfield, Mass., well known maker of ignition specialties, has brought out a master vibrator for service where more than one unit is employed. It is constructed of high grade material and the contact points are fitted with 25 per cent, iridium, making for durability. The master vibrator is neat and compact.



Hilustrating Acressories Applicable to the Commercial Vehicle, including Rexo Electric Hors, J. & B. Master Vibrator, Gemed Emergency Grip and Hortford Spark Ping.



Manicipal Service Equipment



CARTERCAR BANK ON WHEELS.

Specially Constructed Vehicle Which Protects City's Cash from Hold-Up Men.

Until recently, the Detroit city payrolls were distributed by policement on foot, but strange as it may seem, several of these guardians of the law and the city's eash, were held up on their rounds, and the city treasurer was convinced of the necessity of providing some means whereby this danger could be avoided. As a result of the excellent service obtained by the police department of Detroit with friction driven Carterears, made by the Carterear Company, Ponting.



Interior of Carterear, Equipped for City Paymester in Detroit.

Mich, this concern was given charge of the problem. Herewith is presented an interior view of the car produced by the Carterear Company to conform to the ideas conveyed by the city treasurer of Detroit. The classis is the regulation Carterear standard model, but the body construction is of particular interest. It will be moted that the interior presents an appearance not unlike a bank on wheels, and it is maintained that the city's funds are quite as safe therein as in the vaults of a bank.

Every modern convenience is incorporated, so that the paymaster practically transfers his office from the city hall to the Carterear for the time being. This little office is securely locked, and steel bars protect the windows and doors. Even were it possible for the thief to overpower the driver, the paymaster would still be able to defend himself and the cash.

MOTOR PUMPING ENGINES.

Expert Says They Need Excess Capacity and That Manufacturers Aim at Perfection.

At the recent convention of the International Association of Fire Engineers at Denver, Col., Chief Engineer George W. Booth of National Board of Fire Underwriters, delivered an interesting address on "The Efficiency of the Motor Pumping Engine," in which he made many comparisons between that type and the steam fire engine it is gradually displacing. Mr. Booth said in part.

"The automobile fire engine is in many ways a more complicated piece of machinery than the steam fire engine and because of this and the inability to get highly trained men to care for and operate them their etherency is liable to fall off considerably in actual service. As a consequence a certain amount of excess capacity is required, both in the pump and the engine, to offset this liability and provide sufficient lower under all conditions.

"There is a growing tendency among manufacturers of automobile fire engines toward these high-powered motors, since they decrease the liability of heating or other engine troubles and of vibration and consequent loosening or breaking of small parts. making a comparison between the motor pumping engine and the steam fire engine there is one feature on which we have not yet sufficient data to base definite conclusions; namely, the ability to operate efficiently and without serious interruption at fires extending over long periods and especially under adverse weather conditions. It is not intended to argue that automobile pumping engines may not have this ability. but simply they have not proved it as have steam fire engines; we believe they will be developed to possess this ability if they do not possess it already.

"In designing any new type of apparatus it is of constructed be expected there will be certain features susceptible to improvement; some of those have already been discovered and corrected and the desire and intention of manufacturers to perfect their products is encorraging. Automobile fire apparatus does not re-



Patrol Wagan Flitted to 30 Horsepower Packard Chassis for lise by the Police Bepartment in Detroit,

eeve as constant service as commercial apparatus, but its use is generally more severe; considering everything, we see no reason why it cannot be constructed to have a life almost as great as the steam fire engine and to maintain an equal efficiency.

INTERESTING POLICE PATROL.

Motor Truck Body Company of Detroit Provides New Type for Use in That City.

The business of producing special hodies for motor driven classis has developed within recent months along lines which present opportunity for an industry in every way akin to that of manufacturing automobiles, although somewhat separated therefrom. One of these concerns, composed of men who have long experience in the production of bodies of all types, is the Motor Track Body Company of Detroit. It will be conceeded, northus, that there

is more demand for special bodies in certain kinds of commercial handage, but it is interesting to note that this company also has turned its attention to municipal service, work, and with decided success.

An accompanying illustration presents a police patrel wagon fitted to a 30 lorsespower Packard chases in service with the city of Detroit, the body being the work of the Motor Truck Body Company. It is of the enclosed type, and is so built as to provide seats for a driver and one man entirely separate from the main portion, which has accommoportion, which has accommodations for eight or more persons. In addition, provision is made for carrying an ambulance stretcher, so that the vehicle answers all the requirements of police work.

The main portion of the body is enclosed with heavy wire screens, securely fastened, and with an opening at rear of sufficient size for easy passage. In addition to the screens, the sides and rear are fitted with robling curtains of water proof material, which effectually protect the occupants from public view.

The rear entrance is furnished with hand rails of polties by the Pollee Des ished brass. The seat cushions are fabricated of the high-

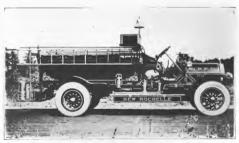
est quality of hand buffed leather. An electric light, protected by a heavy glass globe and connected to a suitable storage battery, is supported on the inside of the roof.

The driver is thoroughly protected from weather conditions by side curtains, and an adjustable wind-shield, the latter being constructed in such manner that a full view of the road may be obtained during rain or snow. In every respect the workmanship and material is of the very best quality throughout.

KNOX FOR NEW ROCHELLE.

City Decides to Bring About Complete Motorization of Department in Near Future.

The city of New Rochelle, N. Y., has just purchased and put into service two pieces of motor fire apparatus, made by the Knox Automobile Company, Spring-



Knox Combination Chemical Engine and Hose Wagon, Recently Installed in New Rochelle, N. Y.

field, Mass. One of these is shown herewith, being a combination chemical engine and hose wagon, while the other is a so-called flying squadron car.

The combination machine is equipped with one 40gallon chemical tank located under the driver's seat and a type C body, having capacity of 1200 feet of 2.5inch water lose, as well as a crew of 10 men. The body is arranged with lockers along each side, in which the men carry their special fire clothing, enabling them to change their clothes while on the way to the scene of the blaze. The remainder of the equipment consists of baskets for chemical hose, hand extinguishers, ladders, fire bell, siren lorn, searchlight on the dash and a full complement of special fire tools.

The chassis is known as the model R-33, and is fitted with a 40 horsepower, four-cylinder motor, special heavy three-speed transmission and chain drive to the rear axle. Official tests, before the machine was placed in service, indicated that the machine is posporation, Detroit. The model chosen is the new long wheelbase, two-passenger roadster, the vehicles being intended for the use of the battalion chiefs.

Before the selection was made, the R-C-H was put to chansive tests under all conditions by the fire authorities. In traffic it showed its ability to travel at a speed of four or five miles an hour on the high gear and pick up again to the maximum. The choice of the R-C-H car is a fine testimonial of the Detroit vehicle, which is a new model introduced about a month ago and which has achieved widespread attention.

PIERCE-ARROW FORESTRY WAGON.

Park Department in Buffalo, N. Y., Solves the Problem of Transplanting Trees.

Perhaps it is due in a measure to the widespread discussion of the subject of conservation, but what-



Five-Ton, Worm Driven Pierce-Arrow Truck in Service with the Forestry Hivision of the Park Department in Buffalo, N. Y., for Transporting and Transplanting Trees.

sessed of excellent speed possibilities and is a powerful bill climber.

The flying squadron car will carry 10 or 12 men, and is to be used in connection with the police department, to rush men to fires for keeping back the crowds and assisting the firemen in their work. It earries one hand estinguisher and a few special fire tools.

The installation of these two wagons, which comprise the first motor driven apparatus of the department, marks the determination of the city to put the entire fire fighting equipment on a motor basis within the near future.

R-C-H FOR BATTALION CHIEFS.

New York City Decides to Put Three Cars of This Make in Service After Tests.

Three R-C-H cars are the latest purchase of the New York fire department, a contract having been placed with the New York branch of the R-C-H Corever the reason, it is certain that the people in the cities are beginning to appreciate more and more the value of growing trees, and whenever it becomes necessary to remove a bandsome tree, now-a-days, some step usually is taken to transplant it in another location. The result has been the establishment of a forestry division within the park department.

There are several problems connected with this work, and none the least of these is the method to be employed in transporting the tree with its roots, branches and leaves, from one point to another. The park department in Buffalo, N. Y., has solved this by the utilization of the five-ton, worm driven Pierce-Arrow truck, made by the Pierce-Arrow Motor Car Company of that city, which is shown in an accompanying illustration.

It will be noted that the load this truck is called upon to handle is bulky, rather than heavy, and for this reason a truck of long wheelbase was selected. The hody is of the platform and stake type, Io feet six inches wide, and the wheelbase is 17 feet. When not employed in transporting living trees, it is utilized in carrying supplies from one part of the city to another in the ordinary work of the park department.

GOODYEAR TIRES ARE SATISFACTORY.

Akron Official Reports That One Set Ran for Three Years on Webb Pumping Engine.

Several fire department chiefs have testified to the satisfactory service they have received from Goodyear tires, made by the Goodyear Tire & Rubber Company, Akron, O., which have been tried out on fire apparatus under varying conditions. Among them is Chief John T. Mertz of the Akron fire department, who says:

"We have a Webb combination pumping engine, chemical and hose wagon weighing 8500 pounds fully loaded, equipped with Goodycar no-rimecut, non-skid tires, that have been in service nearly three years and on which the tires have not been changed since the machine was placed in service until last week when one of them became cut and torn. As a result of the service received of your tires we have specified them as equipment on a new Webb engine and hose wagon recently ordered."

SEEKS MOTOR EQUIPMENT.

Melrose Mayor Says New Apparatus Must Come and Asks for Immediate Motorization.

That motor apparatus is not only more efficient than horse drawn vehicles, but more economical for a city is the opinion of Mayor Charles E. French of Melrose. Mass., who recommends to the city government an immediate change to the motor type. Mayor French desires \$17,000 for installing an engine, ladder truck, combination clemnical and runabout for the chief of the department. This recommendation follows the purchase of motor fire vehicles two years ago,

In support of his recommendation Mayor French points out that the annual cost of the food and care of the horses of the fire department exceeds \$2000. The issue of \$17,000 in bonds, payable \$2000 a year, would not increase the cost of the apparatus to the city and would provide it with the latest type of machinery which will have to be purchased in any event even were horses retained.

WHITE AMBULANCE FOR ATLANTA.

Special Attention Has Been Paid to Matters of Comfort and Convenience in Its Construction.

A private automobile ambulance, designed for hospital work in the city of Atlanta, Ga., has just been delivered to the Barclay & Brandon Company by the White Company, Cleveland, O., maker of White pleasure and commercial cars. The vehicle is of the enclosed limousine type, measuring fully 16 feet in length, splendidly finished in bronze and striking in appearance because of its very unusual size. The doors bear a heavy gold monogram "B. & B." and on the side panel is the inscription "Private Ambindance."

The machine is fitted to a heavy chassis, with 30 horsepower engine and wheels equipped with extra heavy tires, making for easy riding qualities. It is literally a hospital on wheels, containing every known comfort and convenience a patient could obtain at the best hospitals. The interior measures five feet wide by 10 feet long.

Included in the furnishings are: Spring cot and mattress, two leather upholstered chairs, lavatory with hot and cold water, iee water cooker, electric fan and electric lights which can furnish bright or subdued illuminations, medicine chest and equipment. Pipes from the automobile radiator heat the vehicle in winter and the Barclay & Brandon Company is certain the machine cannot be duplicated in this country. The White Company took six months to construct it.

BRIEF ITEMS OF GENERAL INTEREST.

Pope Ambulance a Saver—No less than three ambulance teams of two horses each have been displaced in San Francisco's emergency hospital service by the introduction of one motor ambulance. This is the report given to the Consolidated Motor Car Company, San Francisco, distributor for the Pope-llartford machines, made by the Pope Manufacturing Company, Hartford, Com, which firmished the ambulance after it had been given a thorough test in the city's service. The emergency hospital men say that the motor has proved itself more efficient in every way than the horse drawn vehicles and it seems probable that all of the city's hospitals will be so equipped.

Texas Gity Secures Ambulance—The automobile ambulance owned by F. P. Malloy & Soon, Galveston, Tex., has been engaged by the city authorities to answer all emergency calls within the corporation limits. It has made itself a conspicuous part of the city life since its installation and has been of inestimable value in the transfer of the wounded and ill to the hospitals.

Police Ambulance in Beverly—Mayor Frederick A. Dodge of Beverly, Mass., has signed an order calling for \$1500 for a new motor ambulance for the police department. The ambulance will be ordered soon and will be placed in service as soon as received.

First in New Haven—Beecher & Bennett, an undertaking firm in New Haven, Conn, experts to have in service in a short time the new motor van which it ordered several weeks ago. The specially designed commercial body, which will be mounted on a White 1500-pound chassis, made by the White Company, Cleveland, O, is nearing completion and the firm will have the distinction of having the first power vehicle purchased by an undertaking firm in New Haven.

RECENT MOTOR VEHICLE PATENTS



Morgan Grease Cup Device.

Nels Morgan, Funk, Neb., has been granted a patent for a cap securing device for a grease cup. The latter is provided with a recess in which is fitted the cad of a shouldered stem of a spring. The latter is secured to the base of the cup proper and the tension of the spring prevents rotation of the cap and its possible loss.

Rhett Safety Motor Starting Device.

A safety motor starting device of the mechanical type has been patented by James M. Rhett, Beaufort, S. C. It comprises, in addition to the usual crankshaft of the engine, a second shaft to which is secured a ratchet wheel. A lever is provided with a pawl, pivorally mounted, and the pawl engages with the ratchet wheel and has an edge extending beyond a similar projection on the lever. Lossely mounted upon the second shaft is a disc provided with abutments, the lever and the outer end of the pawl being arranged between said abutments, and a spring tending to press the pawl into engagement with the ratchet wheel.

Daimler Clutch Actuating Mechanism.

Paul Daimler, Unterturkheim, Stuttgart, Germany, assignor to Daimler Motoren-Gesellschaft, has been granted a patent for a clutch actuating mechanism comprising a double cone friction clutch having two cones slidably movable in opposite directions on one shaft and to be coupled under the action of a spring. Friction surfaces are carried by the other shaft to be coupled, and there are concentrically and laterally projecting hubs on said cones. An abutunent is provided on the hubs, with a wedge between abutunents. Means are provided for engaging and disengaging the cones from the friction surfaces.

Clapp Convertible Wheel Tread.

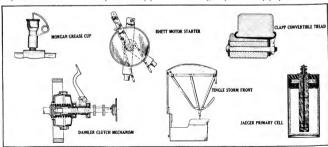
Harold W. Clapp. Berkeley, and Blanchard Collins Edgar, San Francisco, Cal., have been granted a patent for a convertible tread wheel. It comprises a felloe having a side flange whereby it may be adapted for rail service, also a second tire for road work. The latter shoe is superimposed on the rail tire, and integral separated lugs are employed for securing the retaining ring.

Jaeger Primary Cell.

Carl and Bertha Jaeger, Los Angeles, Cal., have patented a primary cell of the dry type which is so constructed that the electrolyte may be stimulated or renewed. The earbon post is provided with a longitudinal passage and leading from it are lateral passages connecting with the surface of the carbon element.

Tingle Storm Front.

George W. Tingle, Chatham, Mass., has patented a storm front for vehicles, which differs from those of usual construction in that the side curtains may be secured to it, completely enclosing the driver. The front is in two hinged sections, the lower being clamped to the dash while the upper is retained in position by hooks locking in eyes in the top proper.



Historing Same of the More Recent Ideas of Inventors of Devices Applicable to the Commercial Vehicle, Including Motor Starter, Primary Cell, Storm Front, Etc.



BRIEF NEWS OF MANUFACTURER ------- AND THE TRADE ------

Participation of the Control of the

Detroit branch of the company

The Crescent Motor Truck Company, Middletown, O., in preparation for the coming season has increased its capital stock to fluous.

The Missouri Taxlesh Company, St. Louis, Mo., has purchased land on Euclid avenue upon which it will erect a garage building to cost \$25,000.

The Pioneer Commercial Auto Commun, Los Angeles, Cal., halbeen formed by C. M. Turner, Agnes N. Fuller and John C. Silck with capital of \$200,000.

The Universal Motor Truck & Traction Company, Treation, III., is to move its plant to Collinsville, III., the latter city having made attractive ladgements.

The Massus-Semmu Transportation Company, New York City, has opened a taxlead station at 712 leathe street, Brooklyn, for the convenience of Brooklyn people.

The Ideal Anto Company, Ft Wayne, Ind. manufacturer of Ideal motor wogons, has built a substantial addition to its plant, enabling it to produce one machine daily.

The Ukinhoma Motor Track Company, Tulsa, Okla, manufacturer of commercial motor tracks, has started a new factory on Boulder street. I. A. Howorth is president of the firm.

The Stewart from Company, Povington, Ky., is erecting a

gasized at Belleville, Mo., with a capital stock of \$25,000 to contract for motor track hauling in St. Louis. William and Frank Bush are stockholders.

The Pierce-Arrow Major Cae Company, Buffalo, N. Y., has given a contract for the erection of three additional stories to its truck assembling building and one story to each wing of the three-story body building.

J. W. Cully, formerly a salesman at the New York branch of the Swinehart Tire & Hinbler Company, Akron, O. maker of Swinehart tires, has been promoted to become manager of the

The Ramsey Electric Company, Detroit, Mich. has just occupied its newly erected building to be used exclusively by electric vehicles of all kinds. The garage is located on Grand builtevard and is of brick and converts.

The Burthart Motor Truck Company, New York City, has been Incorporated for the manufacture of motor commercial vehicles. The incorporators are W. B. Hurthurt, Joseph P. Carroll, William B. Carswell and F. D. Peale.

The St. Joseph Schwartz Company, Ltd., 544 Baronne street, New Orleans, Las. has taken the agency for Adams trucks, made by the Adams Bros. Company, Findley, C., in the states of Lamislana, Mississippi and southern Alabaton.



Bandsome Structure Which Will Be Decapted by the Kelly-Springfield Motor Truck Company so Bendquarters for Ito Boston Branch.

motor wagon (actory in connection with its other plant and will shortly call for idds for the machinery to be installed.

Barlow Gurage Company, Newark, N. J., recently organized to maintain and repair pleasure and commercial vehicles at 233 High street, will open new quarters at 133-135. Washington street.

The Garford Motor Company, Newark, N. J., distributor of Garford trucks, has purchased a site at Central avoide and Hudson street, upon which a two-story lorick garage will be effected.

The Stegeman Motor Car Company, Milwaukee, Wis, maker of Stegeman trucks, has accupied its new plant at 606 Linus street. The capacity of the plant has been increased to 500 Vehicles a very

The Westcott Matur Cur Company, Little Rock, Ark, has taken the opency in that territory for the Pierce-Arraw trucks and pleasure cats, made by the Pierce-Arraw Motor Car Company, Buffalo, N. Y.

The 31. P. Poyer Company, Menominer, Mich, has been incorporated with a capital of \$75,000 to manufacture commercial motor vehicles. The directors are 10. P. Poyer, H. T. Emerson and Faithon Trudell.

The M. Louis Motor Tennsportation Company has been or-

The Hockford Motor Truck Company, Rockford, III., is a new concern capitalized at \$10,000, for the purpose of manufacturing and selling clotter and sasoline motors. The directors are P. A. Peterson, Levin Faust and John Ledin.

The Observed Traction Engine Company, Great Falls, Mont. has been attainted for the manufacture of fraction eigeness and moder tracks and to planning to erect two buildings. It is expected the plant will be in operation by Jun 1.

A. T. Eurbahan, veteran tire salesman of the Swinehart Tire & Rulder Company, Akron. O. has been appointed district manoger in charge of Ohlo, West Virginia. Kentneky, western New York, western Pennsylvania and contern Michigan

The L. V. W. Motor Truck Company, Wilmington, Del. has been formed with capital stock of \$200,000 for the manufacture and sale of under wagons. The members of the concern are 4, 4, Rhides, Clifford V. Mannering and C. R. Ridge.

The Ketty-Springfield Water Truck Company, Springfield, 11, unker of the Kells line, has taken possession of the new Boston bendquarters, an illustration of which is presented herewill. Every facility is efforted for earling for trucks in service with purchasers in Boston and vicinity, and the branch is expected to provise one of the last equipped in this respect in

The W. E. Hush Fompany, Lee Angeles, Cal. has secured L. R. Wadsworth as sales manager and he has charge of the distribution of Pierce-Arrow Holesure cars and trucks, made by the Pierce-Arrow Motor Car Company, Buffalo, N. Y.

Thomas Walker and Supt. Webs and other associates have purchased the Plint Axle Works, Flint, Mich., and the firm mine will be changed to the Walker-Webs Axle Works. The manu-facturing facilities of the plant will be greatly enlarged.

The Bredant Wotor Track Lompany, Montreal, Can. Is a new concern formed to manufacture commercial vehicles. The capi-tal is \$50,000 and the promoters include W. L. Haskell, H. D. Rose, John S. Rigby, V. S. Rose, L. C. Haskell, J. E. Merritt and D. S. Whittall. The Drednot Motor Truck Company, Montreal, Can., Is a new

T. P. Myers of Detroly has assumed his duties as general manager of the General Motors Truck Company's New York City branch. Mr. Myers is one of the pioneers of the industry, having entered the field when motor trucks were first making their appearance.

The Continental Motors Corporation, Buffalo, N. Y., has been formed for the manufacture of gasoline engines. The capital stock is \$100,000 and the directors are fordon F. Matthews. Frank V. Wayland, Allen E. Choale, Walter Schuleding and Reverdy L. Hurd.

The Rrown Commercial Car Company, formed about thremonths ago by Will II. Brown, former president of the Mais Motor Truck Company, Indianagolis, maker of Mais trucks, has purchased the plant of the Oils Elevator Company In Peru, Ind. The company plans to fould 300 ffrom trucks the Britz year.



New Factory Buildings of the Gramm-Bernstein Company, Limn II.

Frank P. Wilcox, Boston, distributor of the Lippard-Stewart light delivery wagon and the Schnicht truck lices, has opened offices at 24 Merchants Row, in the heart of the trucking district. He has also established a large service station for the maintenance of the vehicles he will distribute.

The J. T. Handi Tractor Company, Waterlee, Ia., recently organized, has purchased the plant of the Star Foundry Com-pany and will begin active operations soon. The officers of the company ure: President, John T. Handt, vice president, C. C. Butler, secretary, H. J. Wilson.

B. A. Selier, California distributor of Mack and Saurer trucks, has erected at Sau Processing. trucks, has erected at San Francisco what it is said to be the largest huilding devoted to the exclusive sale and care of mo-tor trucks west of Chicago. It is of reinforced concrete, has a depth of 120 feet, a width of 36 feet and is two stories high.

The Developd-Guilan Motor Truck Company is planning an Increase in its capital stock, a meeting the early part of November being called for the stockholders to vote on the proposition. It is proposed to increase from \$330,000 to \$1,000.000, the new stock to be \$500,000 7 per cent cumulative preferred

The Stewart Motor Corporation, Buffalo, N. Y., maker of Stewart Inhit delivery wagons, has uppointed two new district manusers. E. E. Isenilson has been named for Illinois, east-ern lows and Missouri. With headquarters at Chicago, and W. T. Butler for New York State and northern Pennsylvania, with headquarters at Buffalo, X. Y.

The Power Truck Sates Company, with main offices at Worcester, Mass, of which Rulph Morgan, formerly with the

Morkan Trick Company of the same city, maker of Morkan trucks, is the load, has contracted for the sale of Adams trucks, made by Adams Bros. Company, Fludlay, O., in the states of Malne, Vermont and New Hampshire.

Charles E. Bless & Co., New York City, custern agent of the I marks for Higgs & Co., New YORK CHY, custern agent of the American-Martine cars, has taken the agency for the Stege-man truck, made by the Stegeman Metor thr Company, Milway-kee, Wis. Albert Englebardt, lately with the Universal Truck Company of New York City, has resigned to assume the management of the truck department.

The Kanawha Auto Truck Company, Charleston, W. Va., has chaused its mune and will in future be known as the Elk Motor Truck Company. The officers of the concern are: President, S. A. Aloure, Alex president, W. S. Roberts, seepstary, and treasurer, J. L. Sydenstricker, general manager, Kurl Probst, for-merly of the Peerless and Loyler companies.

The Star Carburgtor Company, 685 East Atwater street, De-The Mar Carourelor Company, 885 East Afwater Street, Inc.
Tool, maker of Niar curivaretors, will be known in the future
as the Star Foundry & Machine Company. The plant has been
extended so that the making of circhivertors has become a small
part of the work done. Another new building will be added at
ones to take cure of the rapidly increasing business.

The Grand Rapids Motor Truck Company, Grand Rapids, Mich., has closed a contract with Albert Nelso of Paris, France, for 4a Decauter Hoosler Limited trucks, the deliveries to ex-tend over a year. Mr. Nelso renducts a large importing house at Paris with branches at London and Brussels and was in tith

country for some time investigating the motor truck situation. The Ware Motor Vehicle Company, Minneapolis, Minn., has

been formed for the manufacture of leen formed for the manufucture of four-wheel drike motor trucks and it is expected the first machine will be ready for shipment by Jan. 1. The concern has purchased a site for a substantial factory, L. E. Roberts is president and J. L. Ware, chief enginteer. The capitalization

The Bramm-Hernstein Company. Lima, O., has practically completed its new factory, which is expected to prove one of the largest plants in to prove one of the targest plants in the country erected for the exclu-sive manufacture of motor trucks. With the exception of one building With the exception of one building, all are of one story, from 5 to 63 feet while, and running a total distance of 316 feet in length. No posts are to be found in any purt of the plant, which is located along the most beautiful to the plant. the main lines of two rullroads, afexcellent manufacturing fording and shipping facilities.

The Federal Motor Truck pany, Detroit, maker of Federal trucks, has appointed new agents as

trucks, has appointed new accents at follows: Pederal Truck Company, follows: Pederal Truck Company, Lima, It. Company, Chatlanouca, Tena, Westerla, Vancauer Jie, B. C.: Barrett, Bross. Allows: Veterla, Vancauer Jie, B. C.: Barrett, Bross. Allows: Veterla, Vancauer Jie, B. C.: Barrett, Bross. Allows: Veter, F. J. Welsof & Co. Aumbelm. Call. II. W. Ibertanders: Inherenfully (al., C. S. Whitten, Boston; F. La-Parare, Central Williage, Vonn. Technimal Monte Ofar Vennagas). Prance, Central Village, Conn., Chedmati Motor Car Company, Cherimant U., Sommeliculli Garana, Fonnichiki, Penn., Alson Cherimant U., Sommeliculli Garana, Fonnichiki, Penn., Char Thompson, Auto Company, Isefecti, George C. Poster & Co. Sexuston, H. J. B. Kirkent, Eugener, Orie, Robert W. Power, Pall River, Moss, Michibarg Mardware Company, Pitchberz, Pall River, Moss, Pallechbarg Mardware Company, Perkeberg, puny, Fresin County, Cal., Pa. W. Reddack, Ramburg, N. F. C. Minas & Co., Hummond, Ind., R. D. & C. G. Britton Company, Harrford, Cason, J. &. Cherral Indivision, Cal., Alamon Molomes C. Minas & Co., Hammond, Ind., H. I. & C. G. Hiffled Company, Idea Company, Houston, Tex., Splinar Bross, Importal, Cal., Solwin Wolfe, Jamestown, N. Y., Smith Bross, Lawronez, Mass. Michael Lawronez, Charletti Andro Company, Minaseph Leonard, S. Martin, S. C. Harris, L. Minaseph Leonard, L. Martin, Cal., Holm Motor Car Company, New Havon, Ponn., Farbridd Andro Company, New Horse, L. Martin, C. L., Hold Motor Car Company, Lawronez, C. L., Hold Motor Car Company, Horsen, M. Martin, C. L., Filon Motor Car Company, Horsen, M. M. & Carlon, C. L., Hold Motor, N. Y., J. H. Lauppe, Sacrament, Cal., C. M. Nelconnett, S. M. Salem, Cre. Cheeseman Auto Company, Salt Lake City, Plab. Manno, Auto Company, Sant Lake City, Plab. Manno, Autor, Care, New York, Steckton, Cal., A. J. Aricken, Stringfeld, Mass., Sampson 100 Works, Steckton, Cal., A. J. Aricken, Mys. Leyen, N. Y., Poliffe Car Company, Tavonna, Wash. Irowand, R. Martin, Tillamook, Co., Tavoren, Chill, John Chen, Manno, Carlon, Wash. Provence, Chil., 2010.

ACCESSORY EXHIBITORS AT THREE BIG SHOWS.

A THE recent meeting of the Motor & Accessory Manufacturers in New York City, 18 manufacturers of such products were admitted to membership. In addition allounent of exhibition spaces at the Madison Square Garden and Grand Central Palace shows in New York City, the Coliseum display in Chicago and the Mechanics' building show in Boston were made to 174 members, as shown by the tabulation below. Each of these shows will be held two weeks, those in New York being Jan. 11-18 for pleasure cars and Jan. 20-25 for trucks; that at Chicago, Feb. 1-8 for pleasure ears and Feb. 10-15 for commercial vehiculations.

cles, and that at Boston, March 8-15 for pleasure automobiles and March 19-26 for mechanical transports. Of course, it is well known that the total list of accessory exhibitors at these shows will include a number of makers who are not members of this association. This holds particularly true of the Boston display, where many of those not included in this allotment will be represented by local dealers. Others, not members, will be seen at each exhibition. The following tabulation gives the makers in this preliminary allotment, the principal product of each and the week or weeks during which they will exhibit at each show:

805

Name and address	Mfr. of	M. S. G.	G. C. P.	Chleag	o Boston
Ajax-Grieb Rubber Co., New York City	Ajax tires	both		both	both
American Ball Bearing Co., Cleveland, O	American axies	first		first	
American Bronze Co., Berwyn, Penn	Non-Gran bronzes	first		both	
American Hardware Corp., New Britain, Conn	Corbin-Brownspeedometer		first	****	
Atwater Kent Mfg. Works. Philadelphia	Kent Unisparker	both		both	
Auburn Auto Pump Co., Boston, Mass	Ten-Eyek pumps	first		first	first
Automobile Supply Mfg. Co., Breeklyn, N. Y	Newtone born	both	****	both	
Aurora Automatic Machine Co., Chicago	Ther metasses		first	first	both
A-Z Co., New York City	Itadia tora	first	nrst		
Badger Brass Mfg. Co., Kenosha, Wis	Solar lamps	both		both	
Baldwin Chain & Mfg. Co., Worcester, Mass	Baldwin chains	both		both	second
Batavia Rubber Co., Batavia, N. Y.	Batavia tires	first		first	first
Bijur Motor Lighting Co., New York City	Electric generators	both			
Borne, Serymser Co., New York City	Colonial oil	first			both
Bosch Magneto Co., New York City	Hosch magneto	both		both	
Bower Roller Bearing Co., Detroit	Hower bearings	both		both	
Bowser & Co., S. F., Fort Wayne, Ind	Storage systems	both		both	both
Briggs Magneto Co., Elkhart, Ind	Briggs magnetos	both		both	
Brown-Lipe Gear Co., Syracuse, N. Y	Clears	both		both	
Buda Co., Harvey, Ill	Buda meters	both	both	both	****
Byrne, Kingston & Co., Kokomo, Ind	Visuatus carburates	both		both	
Carnegie Steel Co., Pittsburg, Penn		both			
Champion Ignition Co., Flint, Mich.	M' Mtar plune	both		both	both
Chase & Co., L. C., Boston, Mass	Ton fabrica	first		both	both
Chicago Drop Forge & Fdy. Co., Chicago	Drop forgings	both		both	
Coes Wrench Co., Worcester, Mass	Coes wrench	both		first	both
Columbia Lubricants Co. of N. Y., New York City	Monogram ell	first			first
Columbia Nut & Boit Co., Bridgeport, Conn	Lock nuts	both			
Connecticut Tel. & Elect. Co., Meriden, Conn	Ignition specialties	both		first	first
Consolidated Rubber Tire Co., New York City	Kelly-Springfield tires	both		both	both
Continental Caoutchouc Co., New York City	United States tires	both		both	both
Continental Motor Mfg. Co., Muskegon, Mich	'ontinental motor			both	
Continental Rubber Works, Erle, Penn	Tires		first		
Cook's Sons, Adam, New York City	Albany greases	both		first	first
Cotta Transmission Co., Rockford, Iil	Fransmission gears	both		both	
Cowles & Co., C., New Haven, Conn	Lamps and trimmings	first	2111	first	1111
Detroit Lubricator Co., Detroit	trass materiais	both	both	both	both
Diamond Chain & Mfg. Co., Indianapolis, Ind	Diamond chains	both		both	* * * *
Diamond Rubber Co. Akron O	Diamond tires	both		both	both
Diamond Rubber Co., Akron, O	Dixon's graphites	both		both	both
Doehler Die Casting Co., Brooklyn, N. Y	Searings and parts	first		first	
Double Fabric Tire Co., Auburn, Ind	nterlock inner tires	first		first	first
Dover Stamping & Mfg. Co., Cambridge, Masst	Pover funnels	first			first
Dykes Co. John L. G. Chicago	Fire accessories			first	
Edison Storage Battery Co., West Orange, N. J	dison batterles			both	both
Edmunds & Jones Mfg. Co., Detroit	c. & J. lamps			both	
Eisemann Magneto Co., New York City F	Sisemann magneto			both	
Electric Storage Battery Co., Philadelphia	torage batteries			both	both
Empire Tire Co., Trenton, N. J	Smpire tires	both		both	first
Endurance Tire & Rubber Co., New York City	indurance tubes	first	1111	first	first
Esterline Co., Lafayette, Ind	Agnting systems		first	first	2000
Findelsen & Kropf Mfg. Co., Chicago	tarfield corburator			hoth	first
Firestone Tire & Rubber Co., Akron, O	Circutone tires	both		both	both
Flak Bubber Co Chicanas Falls Mass	risk tires	both		both	both
G & J Tire Co., Akron, O	'nited States tires	both		both	both
				both	
Garage Equipment Mfg. Co., Milwaukee, Wis	lemce equipment			both	
Gemmer Mfg. Co., Detroit	teering gears	both		both	
Globe Machine & Stamp. Co., Cleveland, O.,	detal boxes	both		both	
Goodrich Co., B. F., Akron, O.,	loodrich tires	both		both	both
Goodyear Tire & Rubber Co. Akron O	loodyear tires	both		both	both
Gould Storage Battery Co., New York City	torage batterles		both	both	
Gray & Davis, Amesbury, Mass.,	iray & Davis dynamos		both	both	both
Harris Oil Co., A. W., Providence, R. I.	tarris olis		** **	both	both
Hartford Machine Screw Co., Hartford, Conn		firet			****
Hartford Rubber Works Co., Hartford, Connt Hartford Suspension Co., Jersey City, N. J	nited States Ures	both		both	both
Havoline Oil Co., New York City. N. J	Javaline olle	both both	both	both	both
Haws, George A., New York City	anhard olls			first	first
Hayes Mfg. Co., Detroit	stetal bodies			first	

Name and address	Mfr. of	Med	G. C. P.	Chlones	Bester
		both	u. c. r.	both	both
Heinze Electric Co., Lowell, Mass	Minimax numps	DOLH	first	both	both
Hess-Bright Mfg. Co., Philadelphia	Hess-Bright bearings	both			
Hess Street Co., Borton, Mass. Hyatt Roller Bearing Co., Newark, N. J.	Hess axles	first	* * * *	first	
Hoffecker Co., Boston, Mass.	Hoffecker speedometers	first		first	first
Hyatt Roller Bearing Co., Newark, N. J	Hyatt bearings	both		both	
Ignition Starter Co., Detroit Imperial Brass Mfg. Co., Chicago. International Ackeson Graphite Co., Niagara Fails, N. Y.,	Disco starter	first		first both	
International Acheson Graphite Co., Niagara Faiis, N. V.	Oldar, Gredar	first		first	first
International Acheson Oraphite Co., Ningara Falis, N. Y. Janney, Steinmetta & Co., Philadelphia, D. A. A. Philadelphia, D. A. A. C. Philadelphia, C. G. Roberts, N. K. Kokomo, Electric Co., Rokomo, Ind. Leather Tire Goods Co., Ningara Falis, N. Y. Leet Tire & Rubber Co., Conshohncken, Fenn. Lefever Arms Co., Stractor, N. Y.	Scamless tanks	both			
Johnson & Co., Isaac G., New York City	Steal castings	both		both	
Kellorg Mfg. Co., Rochester, N. Y.	Kelione tire numps	both		first	
Kokomo Electric Co., Kokomo, Ind	Kingston magnetos	both		both	
Leather Tire Goods Co., Niagara Falls, N. Y	Woodworth treads	first		first	first
Lefever Arms Co. Syracuse N. V.	Truck transmissions	first		first both	first
Lefever Arms Co. Syracuse, N. Y. Link-Belt Co. Philodelphia. Lovell-McConnell Mfg. Co. Newark, N. J. Manufacturers Founder Co. Waterbury, Found. McCord Mfg. Co. Interest. McCord Mfg. A. W. McCord. McCord Mfg. A. W. McCord. McCord Mfg. A. W. McCord. McCord. McCord. A. M. M. W. W. Cord. McCord. A. M. M. W. W. Cord. McCord. A. M. M. W. W. W. Cord. McCord. A. M. W. W. W. W. Cord. McCord. A. M. W. W. W. W. Cord. McCord. A. M. W. W. W. W. W. W. M. W.	Aluminum eastings	both			
Link-Belt Co., Philadelphia	Maximum chains	both		both	****
Manufacturers Founday Co. Waterburn Com.	Cultuder continue	first			first
Marathon Tire & Rubber Co., Cuyahoga Falls, N. Y	Tires	Bret			
McCord Mfg. Co., Detroit	McCord radiators	both		both	
Mezger, C. A., New York City	Windshields, plugs	first		first	firet
Moreon & Wright Datroit	l'olted States tires	both		both	both
Musler & Co. A. R. Mt. Vernon, N. Y.	Spit Fire plugs	both		Both	both
Motsinger Device Mfg. Co., Pendleton, Ind. Motz Tire & Rubber Co., Akron, O.	Motsinger Auto-Sparker	both		both	
Motz Tire & Rubber Co., Akron, O	Mots tires	both	both	both	both
Nutrice Gear Works, Muncle, Ind	Transmissions, etc.	Both		both	both
Muncle Gear Works, Muncle, Ind. National Coli Co, Lansing, Mich. National Tube Co., Pittaburg, Pennon New Departure Mrg. Co., Bristol, Conu. New Jersey Car Spring & Rubber Co., Jersey City, N. J.	Steel tubing	both		both	both
New Departure Mfg. Co., Bristol, Conu	New Departure bearings	both	first		botb
New Jersey Car Spring & Rubber Co., Jersey City, N J.,	Caprinco tires	first		first	first
New Miller Carburetor Co., Indianspolis, Ind	Miller carouretors	both		l-oth both	first
Noera Mfg. Co., Waterbury, Conn	Noera pumps	first		BOTH	Dist
Oliver Mfg. Co., Chicago	Peerless jacks	both		both	
Pantasote Co., New York City	Artificial leather	first		nrst	first
Pennsylvania Rubber Co., Jeannette, Penn	l'ennsylvania tires	both		both	both
Pittsburg Model Paging Co. Pittsburg Penn	Motors transmissions	hest		nrst	nrst
Racine Rubber Co., Racine, Wis.	Tires			first	
Randail-Faichney Co., Boston, Mass	Jericho horns	first		first	first
Remy Electric Co., Anderson, Ind	Remy magnetos	both		both	first
Republic Rubber Co., Youngstown, O	License brackets	both		both	nrst
Ross Gear & Tool Co., Lafavette, Ind	Ross steering gears	both	both	both	
Rutenber Motor Co., Marion, Ind	Rutenber motors			both	
Royal Equipment Co., Bridgeport, Conn	Duplex brakes, Raybestos	both		both	
Sager Co., J. H., Rochester, N. Y	Feerless shock absorbers	first	first	first	firet
Schrader's Sun, Inc., A., New York City.	Tire gauges	both	both	Hist	1111
N. Y. & N. J. Laidricant Co., New York (11) Oliver Mig. Co., Chicago. Pantanote Co., New York City Pantanote Co., New York City Pantanote Co., New York City Pittsburg Model Engine Co., Pittsburg, Penn Hatching Rubber Co., Radine, Wils. Randalt-Falchney Co., Booton, Mass. Republic Rubber Co., Radine, Wils. Randalt-Falchney Co., Booton, Mass. Republic Rubber Co., Falcance Wils. Rose Mig. Co., Philadelphia. Rose Mig. Co., Philadelphia. Royal Equipment Co., Inflace, Ind. Royal Equipment Co., Bridgegort, Conn. Sager Co., J. H., Rochester, N. Y. Schrader's Mon., Inc., A. New York City. Schwartz Wheel Co., Philadelphia. Scanless Rubber Co., New York City. Schwarts Weel Co., Willesbare, Penn. Shimas Magneto Co., New York (11). Shimas Magneto Co., New York (11).	Automobile wheels	both			
Scamless Rubber Co., New Haven, Conn	Rubber sundries	first		firs t	first
Shaler Co., C. A., Waupun, Wis	Shaler vulcanizers	nest		first	first
Sinns Marneto Co., New York City	Simns makuetos	first	both	first	first
Smith Co., A. O., Milwaukee, Wls	Automobile frames	both		both	
Spacke Machine Co., P. W., Indianapolis, Ind	Air compressors		first		
Sparks-Withington Co., Jackson, Mich	Fans and boxes	first both		first	
Spiltdorf Electrical Co. Newark, N. J.	Splitderf magneton	both		both	first
Springfield Metal Body Co., Springfield, Mass	Automobile bodies	first			
Standard Roller Bearing Co., Philadelphia	Ball and roller hearings	both		both	
Slmins Magneto Co, New York (31) Smith Co, A. O, Milwaukee, Missonik, Ind. Sparke Mithinton Co, Jackson, Mich. Sparke Withinton Co, Jackson, Mich. Spiltour Electrical To, Newark, N. J. Strandard Roller Bearing Co, Thilade-lish. Standard Roller Bearing Co, Chicago, New York Chicago Stromberg Moor Devices Co, Chicago Stutz Auto Parts Co, Indianapolis, Ind. Texas Co, New York City, Texas Co, New York City,	Standard speedometers	Bret both	first	first	first
Stewart & Clarke Mfg. Co. Chicago	Stewart speedometers	both		both	both
Stromberg Motor Devices Co., Chicago	Stromberg carburetors	both		both	first
Stutz Auto Parts Co., Indianapolis, Ind	Stuts rear system	both		both	both
Turan Co. Nam Vork City	Terron oils	both	both	both	both
Timken-Detroit Axie Co., Detroit	Timken axies	both	hoth	both	both
Timken Roller Bearing Co., Canton, O	Timken roller bearings	both	both	both	
Turner Brass Works, Sycamore, III	Brass specialties	both		both	::::
United Rim Co., Akron, O	I'mit of States Mass	both		both	both
Swinchart Tire & Rubber Co., Akron, O., Texas Co., New York City. Timken Roller Bearing Co., Canton, O. Timken Roller Bearing Co., Co., Angola, Ind. U. S. Light & Heating Co., New York City. Valentine & Co., New York City.	Universal treads			first	
U. S. Light & Heating Co., New York City	Lighting systems	both		both	both
Vacuum Oil Co., Rochester, N. Y	Vacuum Mobiloils	both		both	both
Vacuum Oil Co., Rochester, N. Y. Valentine & Co., New York City Valentine & Co., New York City Vesta Accumulator Co. Chicago, Ill Vesta Accumulator Co. Chicago, Ill Valorie Rubber Mis. Co., Jersey City, N. J. Walpole Rubber Co., Boston, Mass. Warner Instrument Co., Biolot, Wis. Warner Instrument Co., Bioloto, O., Warner Instrument Co., Toloto, O., Warner Instrument Co., Toloto, O., Warner Instrument Co., Walley, Warner Mistrument Co., Walley, Chi, Wis. Warner Mistrument Co., Walley, Warner Mistrument Co., Toloto, O., Warner Mistrument Co., Walley, Warner Mistrument Co., Walley, Walle	Varnishes Vander recorders	both		first	first
Vesta Accumulator Co. Chicago, 111	Storage batteries	both	both	both	
Voorhees Ruhber Mfg. Co., Jersey City, N. J	ideal inner tubes	first		first	both
Walpole Rubber Co., Boston, Mass	Waipole tires	first	2002		
Warner Gear Co., Muncle, Ind.,	Warner Auto, Maters	both	both	both	both
Warner Mfg. Co., Toledo, O.	Unit power plants	both	first	both	both
Waukesha Motor Co., Waukesha, Wis	Waukesha motors			both	
Weed Chain Tire Grip Co., New York City	Weed tire chains	both		both	first
Western Tool & Forge Co., Brackenridge, Penn	Drop forgings	nrst		both	****
Wheeler & Schebler, Indianapolis, Ind.	Schebler carburetors	both	both	both	****
White & Bagley Co., Worcester, Mass	Cilzum olla	first		first	first
Whitney Mfg. Co., Hartford, Conn	Whitney chains	both		both	second
Willard Storage Battery Co., Cleveland, O	LRA batteries	both	****	both	both
Wolverine Lubricants Co. New York City	Wolf's Head oils	both		both	both
Waukesha Motor Co, Waukesha, Wis. Western Tool & Forge. Co, Hirscheridier, Fron. Western Mot & Forge. Co, Hirscheridier, Fron. Western Mot Co, Filint, Mich. Western Motor Mot	Tire repair outfits	both			

Objitizado Google

MOTOR TRUCK Devoted to Motor Driven Business Vehicles of All Classes.

VOL. III. PAWTUCKET, R. I., DECEMBER, 1912

No. 12

LIGHT MOTOR WAGONS IN LAUNDRY SERVICE.

Largest New England Establishment Replacing District System with Direct Routes and Covering a Territory 50 Miles in Length--Utilized for Suburban Work Automobiles Have Many Qualities Besides Economy.

THE laundry that does a profitable business seldom if ever exists without vehicle equipment. As a rule patronage is scattered, at least sufficiently to justify the use of animal or motor wagons for collection and delivery, and generally it may be said that under the most favorable conditions the cost of collecting and delivering the work is largely in excess of what would be expended by other enterprises for transacting a similar volume of business. To illustrate, in a shop when a sale is made the purchase is delivered to the buyer without cost unless at considerable distances. The laundryman sends for the work and returns it, making two distinct trips, and with the calls for collections and deliveries where people were absent or the packages, bundles or baskets were not ready for the regular route trips, it will be understood that there is really more vehicle travel than is represented by the two separate visits. Just what proportion this excess will represent cannot be determined with exactness, for it will vary considerably.

The business of the laundries is largest in the warmer months, as linen and clothing is more quickly soiled during that period of the year, and with the temporary residences at the shore and in the country the service is considerably larger than during the autum, winter and spring. Some laundries depend practically upon custom from areas comparatively limited, while others secure patronage in sections widely separated. Some endeavor to serve their patrons if this can be done, even at a sacrifice of profit for a portion of the time, because in this manner their custom can be retained.

It is not possible to average conditions and it may be said that there is a very wide difference in the methods the vogue with laundries doing what may appear to be precisely the same characters of business. Each enterprise must be considered separately to understand clearly the haulage requirements, but it will be seen that the large element of transportation expense cannot be greatly reduced. That is, the public has been educated to the convenience of the work being called for and returned, and as this lessens the attention that must be given by the individual who must collect and make the washing ready in the home or place of residence, beside eliminating the labor that would be entailed by household laundering, there is



The Aniocar Wagons I sed by the What Cheer Lanudry, Providence, R. L., in Covering Houtes from 12 to 25 Miles Ulstant from the Plant.

no reason to believe there can be a diminution of this cost. There are several reasons why it is probable there can be no reduction of cost unless by a complete change of methods.

This will be understood from the following illustration of the system that is very generally accepted by the laundrymen: The laundry will seek business, and employs a driver whose work is to drive a horse and wagon with which he collects the washings on a stated route. He receives a commission on the amount of business his route represents, and the supposition is that this will impel him to retain his customers and add as many new patrons as he can. Of course there are limitations as to what he can do, but a man would seemingly desire to keep his route to its highest pro-



The What Cheer Laundry Routes, Dotted Line Circles Showing Approximate Aceas—Nos. I and 3 Were Secred by Horse Outfits at North Attleboro and East Greenwich; an Animal Wagon is Still Kept at Warren, Indicated as No. 2, and No. 4 is Cared for by an Agent with a Light Machine.

ductiveness, as he directly benefits. As horses are generally used the routes are limited to what may be considered reasonable mileage for the days they are worked. With the calls at the homes and places of residence the driver learns of the satisfaction with the work, and if he is energetic he may be able to secure additional patronage from time to time that adds materially to his commission.

Were the routes simply to places where laundry work had been left by the customers it would be necessary to pay commissions to the agents and salaries to the drivers, without conveniencing the patrons or keeping in close touch with them, and the laundry would be without personal representatives as well as paying more for the collection, though the transpertation cost would be less. It will be seen that from the viewpoint of the laundryman, whose experience may be extremely varied, it is not wise to depart from the individual collection and delivery system, despite its expenses.

Were the routes developed on the basis of smallest mileage that would be ideal, but they are of necessity of considerable length and occasionally are extremes. They differ widely with the work to be done. Where the family washing is taken and the clothing cleaned and returned wet, ready for drying, often not more than two hours may clause between collection and delivery, and never more than a night intervenes. Where the washing is cleaned and dried more time is taken, and a day or more may be regarded as reasonable time. When the work is finished, that is, washed, dried and ironed and polished, as in the case with linens for wear, several days may be required. Some laundries specialize work, and in one case that came to the attention of the writer no less than 1700 washings are done weekly, each of which must be collected and delivered, making a total of approximately 3403 different calls by the drivers and a large mileage for the animals and vehicles. Other laundries combine wet washing and washing and rough drying, while the majority do these and finished work as well. The collections are made with reference to the equipment. although it may be said that the first two days of the week are devoted to collecting, the third and fourth to collecting and delivering, and the fifth and sixth to regular delivering and occasional special deliveries. There are, of course, special orders that must receive attention, and these must be provided for without much reference to the routes as made, and are either collected and delivered by the drivers or special trips are necessary.

When the routes are established it may be from soliciting, which may result in a large number of customers comparatively close together, or they may be considerable distances apart. In some instances the calls are so frequent that a driver may walk from house to house at times, the horse following him in the street, Where they are further apart the driver may ride, But the greater part of the time, sometimes as much as 60 per cent., is taken up by stops. With routes of this character the experience has been by most laundrymen that the animal is superior to the automobile, and it is maintained that a single driver can always handle a horse, but it is not generally believed practical to use a single man on a motor wagon. This opinion, however, is not shared by all. Others maintain that the time required for stopping and starting a machine minimizes its usefulness and that a driver will object to the labor necessitated by frequent calls.

There are in the city of Providence, R. I., a number of laundries that have gasoline automobile wagons in service, and these machines have been used with considerable success in what may be regarded as long haul work, but they are not worked on routes only when these are considerable distances from the laundries and the time can be saved in the driving. There are different views of the economies resulting from the use of power wagons, and while it cannot be said that the comparisons have been carefully made, nor that the fullest results have been obtained, it is a safe conclusion that they will not be replaced by any other form of vehicle.

The What Cheer Laundry is maintained to be the largest enterprise of its kind in New England, having its plant in Burgess street, where more than an aere of floor area is in use and where 250 persons are employed during the winter months and 300 in the summer. This concern has in its service 17 horses and two Autocar wagons, the machines being of 1500 and 3000 pounds capacity. The smaller was purchased nearly two years ago and the larger about a year later, and prior to the purchase of the second Autocar a Cadillac delivery wagon was used for a considerable length of time, this being the first auto-

mobile in the service.

This laundry's business extends from the Attleboros in Massachusetts at the north to the villages of Saunderstown and Barber's Heights at the south, that is directly served by its own machines, and an agent who devotes his time to the work, using his own Ford delivery wagon, covers Narragansett Pier, Wakefield, Peacedale, Kingston and Rock y Brook, so the territory served is approximately 50 miles in length. Besides this the towns

east side of Narragansett bay are of sufficient importance to receive daily service by a man located in Warren.

Prior to the use of automobiles the laundry had three suburban or out of town services. One included Attleboro and North Attleboro, the two having a population of about 25,000 persons. A horse and wagon were kept at North Attleboro, in which town the driver lived. This man collected the laundry work and it was shipped by express to Providence, hauled from the express delivery section to the laundry, and after cleansing was transported to the express receiving section, returned to North Attleboro and taken to a store. In the collection of laundry each work is picked up by the driver as a bundle, package or perhaps a basket, and the only essential is that the groups of articles be kept separate, which facilitates handling. It is not purposed to give attention to the cleansing methods, but it is apparent that economy of time in all the departments is desirable.

In preparing laundry for delivery conditions may

vary somewhat. The volume may be greater and there are other factors that may make impossible a rigid schedule, but with the manner of serving the Attleboros customers it was necessary to make deliveries to the express receiving station absolutely on time. The boxes, packages and baskets were placed indiscriminately in a wagon and taken to the express company's receiving station, transferred to a car, delivered at North Attleboro, received by the driver and sorted at the store, and then delivered. Were there no place for sorting the packages this work would necessarily be done on the platform of the express station, where exposure to rain or snow would affect the appearance of the work or the packages, and this, with the numerous handlings and the indifference of the express company's employees in the cars, would create an appearance of the work extremely unfavorable when delivered to the customers. Under any circumstances some of the conditions could not be avoided and the renting of a store or space for sorting afforded only a partial protection from damage.



of Warren and Bristol on the The Chase 2000-Pound Wagon Ullized for Long and Suburban Routes by the White Star

This North Attleboro station of the company did a business that required the active work of the driver and a horse and wagon each of the six working days of the week, and there was a limitation to the business that could be done with this equipment. The same character of work was earried on with an outfit located at East Greenwich, and another located at Warren. North Attleboro is 12.5 miles and Attleboro 11 miles from Providence and Warren and East Greenwich are respectively 11.5 and 12 miles from that city. To go to either of these places and return to Providence would be a long daily mileage for any horse, even were no load drawn, and to cover the routes from those centres in addition would be an impossibility with one animal. Carrying the work between Providence and these points by express practically eliminated the work of one horse, wagon and driver,

To have a knowledge of the routes it should be stated that those from North Attleboro were to Attleboro and Plainville and were in compact residential sections as a rule. Probably the greatest distances from the accepted central point were three miles in one direction and six miles in another. That in Warren and Bristol covers a section of perhaps seven miles length and two miles width, but that from East Greenwich extended along the shore of Narragausett bay from Hillsgrove to Wickford, a distance of about 13 miles, but seldom more than a half-mile width.

When the first Autorar was purchased the Cadillac machine had been utilized for a considerable period, but its small capacity precluded it being used for routes where it could haul what might be regarded as large hads if measured by bulk. Its use might be regarded as special work, for it was more with a view of preserving and satisfying patrons than from economizing cost. Still, the cost was comparatively small and wherever the routes were long the main economy was in time.

After experimental work with the Autocar it was

o'clock and returning from 5 to 6 in the afternoon.

With both wagons two men are used, the helper generally doing the collecting and delivering, the driver being responsible for the machine and the load and overseeing its collection and delivery. There is not a material saving in money, but where it was necessary to hold work for a day because of a delay that prevented sending by express the wagon may be held and the delivery made practically on time. Besides this he load is sorted when put on and as there are but two handlings instead of six the packages reach the customers in the best of condition. They are always fully protected and the contents are never crushed or damp. These are factors of material value and of much importance from a business point of view.

The two machines are kept at the service station of the Autocar Company, the larger with and the smaller without a maintenance contract. This eliminates the garage problem that many owners have to

> meet, but it is believed to be the better plan when possible, and it is regarded as an insurance of service. Costs have not been kept so as to make comparisons, but from the judgment of the owners the machines are an excellent business investment. The probability is that there will be at least another vehicle added to the equipment and used at Warren and Bristol. however, has not as yet been decided. With the approach of cold weather the Fast Greenwich route has been con-

Montes. from the return of many customers to the city for the winter, and the smaller wagon will be kept busy with this work and will be used to some extent in Pawtneket, which is now served by hores wagons, some of them going as far as Lonsdale, which is about eight miles from the

Nearly two years ago Hennessey's Laundry began the use of a White I 500-pound wagon, which has been used constantly since that time, and the machine is giving excellent satisfaction, having been driven considerably more than 2000 miles. Besides this vehicle the laundry uses 10 animal wagons. It can be said that the plant is large and well established and its custom is drawn from an area considerably outside of Providence. The White chassis was bought and equipped with a body built purposely for the service, this having a large top in which is a rack that folds against the sides and is carried on two cross members when in use. Raised, the rack permits the use of the

entire body capacity, and lowered it is utilized to carry the boxes when the machine is sent out for delivery. The laundry has sought to use the wagon in what-



The White 1500-Pound Wagon in the Service of Hennessey's Laundry, Providence, R. 1. Siderably reduced in mileage

plant.

decided to discontinue the East Greenwich station and to make the collections and deliveries with the machine in the same manner that the others were served with horses, eliminating one horse and wagon and the express and incidental haulage cost. Not only this, the route was extended six miles further south to Saunderstown, making the total length of the territory served approximately 20 miles, and the furthest distance from the laundry about 25 miles. While the roads were badly worn and it was severe use to drive as fast as was necessary with the machine, the wagon proved by work accomplished and the cost that it was a decided addition because of the improved service and the satisfaction afforded the customers. The wagon was found to be small for work of this nature, and this season when it was decided to give over the North Attleboro station and serve the routes direct, the 3000pound machine was purchased. The greater capacity more nearly met the demand and it is used to make six round trips each week, leaving the first three days about 7 and returning from 4:30 to 5:30, and leaving with deliveries the last three days from 9:30 to 10:30

ever work is believed to be economical, and no short route had been served by it. But where the routes are long, or are a considerable distance from the plant, the machine is regarded as an excellent proposition from every point of view. The wagon is driven by Robert McGee, a driver with a highly commendable record as a soldier, who had experience in driving in the United States service, and his training is reflected in the volume of work done and his care for the machine. Not only this, there is the application of system by him that is not always to be found with men less thoroughly trained.

An idea of the routes traversed by the wagon cannot be given by mentioning localities unknown to the reader, but it may be said that the route that covers Riverside, Barrington, West Barrington and Narragansett Terrace has a mileage of about 25 miles, and a route reaching Edgewood, Lakewood, Hoxie, Cole's, Conimicut, Bayside, Nausuket, Apponaug, River Point, Natick and Eden Park, a total of about 40 miles, both of which have been traversed regularly in a day, the former in the morning and the latter in the afternoon, making the aggregate for the day about 65 miles. The largest mileage for any single day has been 96 miles. and the average is now about 1000 miles a month, but from June 1 to about Oct. 15 the total will be about 1400 miles monthly. This gives the minimum of about 38.5 miles and a maximum of 54 miles during the periods named. On the routes served the machine is worked Mondays and Tuesdays collecting, Thursdays and Fridays delivering, with Wednesdays given over to special trips and emergency calls wherever they happen to be, while Saturday is devoted largely to delivery.

At this season of the year the machine is used for collecting on the west side of Narragausett bay, going as far as Oakland Beach, Mondays and Tuesdays it is used on the Lonsdale route, which has a mileage of about 32. This can save a great deal of time in going to and from Lonsdale and a helper is taken on this trip, so that the work is at the laundry by 4:30 or perhaps earlier. When the days are short much time is saved because the drivers cannot work as rapidly after dark. This route is delivered similarly on Thursdays. Because of the fact that the driver is paid a salary and the work is variable, it is impossible to obtain exact facts, but the work done could not be done unless with two horses and two men for each of the two routes served. The cost of fuel is not large, for the average is about five gallons of gasoline daily when the routes are long, and it is now about 25 gallons a week. This machine is cared for by the driver and it is well kept and is in excellent condition. This machine is equipped with pneumatic tires and these have given entire satisfaction, probably because the loads, though bulky, are seldom if ever to the capacity of the wagon.

The White Star Laundry is located in the southern part of Providence and it does very largely a family trade. Within the past few months its business has increased materially and it now does about 850 wet washings besides rough dried and finished work. The area covered by its routes is not large when contrasted with those described, but it is necessary to work rapidly to bring in and deliver the washings, which are collected and often returned within 2.5 hours, The plant now has a Chase one-ton wagon, which was purchased about two months ago, and previously it used a wagon which was an enclosed body installed on a Mitchell touring car chassis. This machine was limited in capacity to a comparatively few baskets and it required much more time to cover a given route. Manager Haslam bought the Chase wagon after considering the requirements, and provided a body that is large and well adapted for the work. It is possible to carry from 50 to 60 baskets and these can be packed so that they may be handled conveniently and with ease by the driver, for but one man handles the ma-



The Interior of Hennessey's Laundry Wagon, Showing the Division by Folding Rack, the Upper Section Being Used for Boxes and the Lower for Bankets.

chine. The wagon is used in the longest hauls to be made and there is a decided saving in time. The estimates that it will equal the work done by two borses, wagons and men under the conditions of his business, and will considerably exceed this if the routes are long. The main proposition at the beginning of the week is to bring the washings in as quickly as possible, and to deliver them when finished, and for this and for handling rough diried and finished work the results have been entirely satisfactory. The Mitchell wagon is still used to some extent, but chiefly for special and emergency trips.

One of the purposes for which the wagon is used is developing new business, in which it is very useful, and the possibility of serving customers at a distance is decidedly increased as compared with the usual methods. The laundry has found there is a considerable advertising value in the appearance of the wagons in the highways and while its value is more generally speaking, when the routes are of length too long to be well served by horses, it has another economical quality in its large capacity. This is particularly desirable when serving families. It has been found that the machine costs practically no more to operate than the smaller wagon and it will do at least twice the work. The two are garaged by the company in its barn connected with the plant. No figures have as yet been computed for the cost of operation, but by the management the wagon is regarded as a good investment.

The firm of Cullen & Galligan, in East street, does a business with the routes in different sections, and it uses: a wagon that is a converted Fiat touring ear chassis, this having been sold by the original owner because it was equipped with make and break ignition. It has a 40 horsepower motor. The chassis was turned over to Joseph Cullen of Pawtucket, a blacksmith, to be adapted for service purposes, and there is



The Flat Wagon, a Conversed Touring Car Chands, Operated by Cutten & Galligan in All Kinds of Service with Decided Success.

no question that he made a thorough job, strengthening the construction wherever needed and somewhat increasing the weight. The machine is driven by jackshaft and side chains, this being the original power transmission system of the car, and this made the job comparatively inexpensive. The speed of the machine was reduced to the maximum by sprocket changes, although there could be further reduction by change of gear sizes in the gearset. It was estimated that the wagon had a load capacity of approximately 5000 pounds, and a body was constructed for it that is unusually large, it having an enclosed space that will hold 82 baskets of the size in which washings are carried. This number is larger than any load that would ordinarily be taken, but it is possible to serve a large number of customers in a section considerably removed and yet cover the route but twice.

There are those who might assume that the conversion of a touring ear is not practical, but this was a high priced chassis that was but little worn. It was with a transmission system of the type adopted for

the largest and heaviest vehicles. It was strengthened and reinforced. The machine when placed in service represented but comparatively small expense. When first used it was equipped with pneumatic tires. The body design was such that practically all of the load weight is carried by the rear axle, and after a thorough trial it was decided to make a change to solid tires for the traction wheels. This was found to be wise, for the tires on the machine have been driven 12,000 miles, and appear to be good for substantial additional service. The wagon was ready for use about Oct. 1, 1911, and after 13 months' constant driving, during which about 250 miles a week was driven, it was withdrawn that the ignition system might be changed, for it was believed this might economize fuel as well as lessen the attention necessary with the make and break mechanism. This also afforded opportunity to overhaul the chassis, which was found to be in admirable condition. It may be said that one of the firm usually drives the machine and this may be one of the reasons why it has endured as it has and

why such surprising results have been obtained.

The business done by the laundry was taken care of with three horses before the machine was used, and after it was in service two of these were dispensed with, but it was found possible to extend a route into Rehoboth and to increase another in East Providence, and to add to two others. in South Providence, Much of the custom is wet washing, and quick collection and delivery is essential. In the summer the business is naturally larger than during the colder

months and the usual speed of the vehicle is large element of economy when it is used It might not be so economical, it driven by a paid driver. however, were The members of the firm regard it as a good investment and say that it does the work of three horses and wagons, and that while two men are required as it is used it is in every way economical. They believe that were the work such that the hauls could be from points where the work was collected by animal wagons and hauled to and from the laundry it would demonstrate a much larger saving. The large capacity of the motor undoubtedly necessitates the consumption of more fuel than might be needed with a different type of machine, but they believe that it offsets this by its large capacity. The firm owns a Regal runabout that has been used to make special and entergency trips, and this is to be adapted so that it will have increased capacity and can be better utilized.

A considerable element of economy is that the members of the firm care for the machines themselves

and the garage expenses are comparatively small. While horses have not been dispensed with entirely it is probable that they will not be increased in number unless it is found desirable to establish routes where the Fiat machine can be utilized for transfer purposes.

With all of the instances referred to expense cannot be accurately estimated nor can service be well compared, because as a rule the work is different than what had been done with horses, but for the uses stated without exception the machines have been found economical and satisfactory.

NEWS OF THE COMMERCIAL VEHICLE INDUSTRY.

Federal Declares Stock Dividend---United States Motor Company's Sale Date Set---Several Concerns Adding to Their Capital---Other Items of Interest.

The Federal Motor Truck Company, Detroit, maker of Federal one-ton trucks, has declared a stock dividend of \$94,000 and a 10 per cent, cash dividend, according to an announcement recently made by General Manager Martin L. Pulcher. The company was incorporated only three years ago with capital of \$100,000 and during that time the output has steadily increased. The first year 50 commercial vehicles were manufactured, while 135 were made the second and 750 the third. The output for 1913 is scheduled at 1000 trucks, but this nav be exceeded.

The company has been forced to move three times to care for increasing business and it now occupies the large and modern factory originally built for the Van Dyke Motor Car Company. Additions doubling the plant's capacity are planned for the near future. T. E. Reeder is president of the company: Edwin Denby is vice president; Garvin Denby is secretary and treasurer, and Martin L. Pulcher, to whom is ascribed a large part of the concern's success, is general manager.

MANLY DRIVE ON THE COAST.

Hydraulic Auto-Truck Corporation Licensed to Build in Los Angeles Factory.

The Hydraulic Auto-Truck Corporation has been organized in Lus Angeles, Cal., to produce commercial motor vehicles utilizing the Manly hydraulic transmission, having been licensed by the Manly Drive Company of New York City, which concern controls the patent rights in this country. In addition, the corporation has seemed the Pacific Coast agency for the American-La France hydraulic truck, also equipped with this drive. The directors are W. E. Barnes, H. W. Whitford, T. W. Burger, T. L. Mc-Faddin, D. L. Whitford, J. J. Kinchan and M. B. lacobs.

D. L. Whitford is general manager and is well known in the industry from the Atlantic to the Pacific. As early as 1899 he was associated with John Brisbane Walker in the promotion of the Mobile Company of America, then interested in steam carriages. He is said to have brought the first Daimler car, fitted with a Knight sleeve valve engine, to this country,

and he has been instrumental in locating a number of branches for several automobile concerns on the Pacific Coast.

The company not only intends to build trucks of all sizes, ranging from those of one ton to six tons capacity, but also will enter the transportation field with a big line of trucks and trailers, as soon as the Panama canal is open. It is anticipated that this end of the business will enable southern California merchants to transport goods with the greatest possible dispatch, instead of being compelled to depend upon railroad service. The offices of the corporation are at Piov and Grand streets, Los Angeles.

JUDGE HOUGH SETS SALE DATE.

Expected That W. E. Flanders Will Head Reorganized United States Motor Company.

While there appears to be a number of matters that are not fully cleared up in connection with the proposed reorganization of the United States Motor Company, Judge Hough of the United States district court in New York City, has signed an order for the sale of the property Jan. 8. Bids are to be filed with the receivers at 61st street and Broadway, New York City, until 10 in the morning, and will be opened in court at 11.

The tentative decree provides that the property of the present concern shall be offered in six parcels, that of the several interests involved being separated as follows: United States Motor Company, Alden Sampson Manufacturing Company, Briss Runahout Company, Columbia Motor Car Company, Dayton Motor Car Company and Maxwell-Briscoe Motor Company.

From several reliable sources it is understood that Walter E. Flanders, at present president of the Flanders Motor Company, Detroit, is to become president of the reorganized company, although nothing definite has been made public by Mr. Flanders hinself. This move is said to include the absorption of the Flanders company, and to be contingent upon the successful issue of other plans now under way. The receivers amonome the appointment of Mr. Flanders as manager of the present company.

NEAL RETIRES FROM PRESIDENCY.

Becomes Chairman of Directorate While Nash Heads General Motors Company.

After a two years' term as president of the General Motors Company, Detroit, of which the General Motors' Truck Company, Pontiac, Mich., is one of the constituents, Thomas Neal is relinquishing that office, and will be succeeded by C. W. Nash, for some time past manager of the Buick Motor Company's plant at Flint, Mich.

The move is strictly in keeping with the understanding between Mr. Neal and the company when he took office. In the fall of 1910, when the big concern was refinanced and the executive offices were moved from New York to Detroit, the financial interests supporting the company realized the necessity of secur-



Thomas Neal, Retiring President, General Motors Company,

ing as president a man of very broad lmsiness experience. Mr. Neal was approachedand preed to take the office, but he accepted with some he sit ane v. because of the personal sacrifiee involved, and only on condition that he might be permitted to retire at such time as the business was reestablished on a satisfactory ba-

eral Motors Company. sis. When it is known that the General Motors Company was able to show a net earning of over 17 per cent, on the common stock during the past year, there can be little doubt that the task has been accomplished.

To his many friends Mr. Neal is best known as a man of domestic tastes, who derives his greatest pleasure from his home life, for the enjoyment of which the past two years have given him but little time. It will be a source of much gratification in the industry to learn that he is to retain his connection with the company and will serve in a definite and official enpacity as chairman of the board of directors.

PALMER-MOORE INCREASES CAPITAL.

Syraeuse Marine Motor Concern Will Bring Out New Vehicle Utilizing Two-Cycle Engine.

The Palmer-Moore Company, Syracuse, N. Y., has increased its capital stock from \$100,000 to \$200,000

and will at once begin the manufacture of motor trucks in the plant of the Syracuse Store Works in North Geddes street, which it has purchased. The following are the officers of the concern: President, T. G. Meachem; vice president, T. W. Meachem; treasurer, Charles L. Palmer.

For about two years the company, which formerly manufactured marine motors, has been experimenting with a two-cycle motor patented by Edward Moore and the perfected design will be embodied in the new truck, which will be known as the Moore. It will be air-cooled in the lighter type of vehicle and watercooled in the heavier type. The plant has been appraised at \$76,000 and covers 3.5 acres of land.

TAKES OVER OLIVER TRUCK.

New Company Is Organized to Continue Production of Two Commercial Types.

The Oliver Motor Truck Company was organized recently in Detroit and has purchased all material, blue prints, patterns, jigs and dies, together with patents and all future rights of manufacture of Oliver cars, from the receiver to the Oliver Motor Car Company, Detroit, Gus A. Meyer is president and general manager, while Fred J. Meyer is treasurer of the new company. Both are Detroit business men. The organization of the sales department is being intrusted to Ray F. Beach, who was formerly connected with the sales department of the Oliver Motor Car Company.

It is the intention of the Oliver Motor Truck Company to manufacture the Oliver 1500-pound light delivery wagon and the 3000-pound Oliver truck, with a few changes made for the betterment of the cars. The company will be located at 460 Lawton avenue, Detroit, Mich. It is said that the first machines will be ready for shipment in the near future. Mr. Beach recently returned from a trip through Missouri and Nebraska and reports a large demand for light delivery vehicles and trucks in that section.

NEW MODEL FROM SAVANNAH.

Several of the Vehicles Are Giving Good Service in the Hands of Their Owners.

The Saxamah Anto Repair Company, Saxamah, Ga, has entered the motor truck manufacturing field and has delivered several of its new vehicles to Savannah business houses. The John Sullivan, Jr. Company ordered the first truck of the company and so pleased were the officials with its service that another and larger one was ordered.

It is understood that another Savannah firm haconcluded arrangements for four of the trucks and should these prove all that is claimed for them, it is probable that the Savannah Anto Repair Company will engage permanently in the manufacturing business, since it has good prospects of cultivating a prolific field for the truck industry.

MORE CAPITAL FOR WILLYS.

New York Concern Will Underwrite Balance of Preferred Stock and Common Will Be Increased.

Announcement has been made that William Salomon & Co., New York City, will underwrite \$2,900,000 of treasury stock of the Willys-Overland Company, Toledo, O., which has an authorized capital of \$10,000,000 occommon and \$5,000,000 preferred. Only \$2,100,000 of the preferred stock has been sold and the Salomon undertaking has to do with the balance. The common stock also is to be doubled, the Salomon concern to purchase \$5,000,000 worth of the paper and the balance to be retained by Mr. Willys. No change in the management of the company is contemplated, or in the executive staffs of any of the subsidiary companies.

The new plans simply add a large amount of cash assets to the Willys-Overland Company, the business of which has increased to double what it was a year ago. The Willys properties consist of the Willys-Overland Company, Toledo, O.; Kinsey Manufacturing Company, Toledo; Federal Motor Works, Indianapolis, Ind.; the Garford Company, Elpiria, O.; the Morrow Manufacturing Company, Elmira, N. Y., and the Gramm Motor Truck Company, Lima, O.

TO MANUFACTURE TRACTION PLOW.

Union Tool Company Will Erect Plant in California for New Production.

The Union Tool Company, Torrance, Cal., has let the contract for the erection of a factory to cost \$100,-000 and to be completed within 90 days. The plant will lie directly east of the Union Tool Company's \$1,000,000 institution and between it and the \$100,000 plant of the Pacific Metal Products Company, and will be used for the construction of traction plows and motor trucks. The building will occupy a space \$2 by 240 fect and will be two stories high.

The traction plow, which will be constructed on the lower floor, will be 80 horsepower and will be capable of throwing four furrows at one time. The wheels will be six feet in height and the engine will be placed directly over the forward asle. The construction of the new machine is really an innovation in the automobile business as far as the West is concerned, and is plauned for export trade as well as for use in the southwest, the Sacramento and San Joaquin valleys.

It is expected the erection of the plant will be followed shortly by the construction of plants for the manufacture of touring cars and runabouts, although at present this project has not been financed.

PEERLESS TO INCREASE CAPITAL

Meeting of Stockholders Called to Add \$7,000,000 to Present Issue of \$3,000,000.

Stockholders of the Peerless Motor Car Company, Cleveland, O., maker of Peerless trucks and pleasure cars, will be asked at a special meeting Dec. 20, to consider and vote upon the projosition to increase the authorized capital stock of the company from \$3,000-000, its present authorized stock, to \$10,000,000.

This is to be divided, according to the plans, into 100,000 shares of \$100 each, of which issue \$0,000 shares shall be disposed of as preferred stock and the remainder as common stock subject to the usual restrictions. The stockholders will also yote upon the matter of authorizing the directors to dispose of the increased stock.

GILLIG TRUCK ON PACIFIC COAST.

Interesting New Light Delivery Vehicle Makes Its Appearance in San Francisco Market.

Leo Gillig of San Francisco, who has been connected with the motor car trade for several years, has entered the manufacturing field and has produced the first Gillig truck from his plant in that city. The vehicle has 1500 pounds capacity and exhibits some new and decidedly interesting features. Mr. Gillig has contracted to place 50 of his trucks on the market for the 1913 season.

The new light delivery wagon has chain drive with patented differential of the most simple design. Either solid or pneumatic tires can be used and the bodies are built to suit the convenience of the purchaser.

GOVERNMENT CALLS FOR BIDS.

Secretary of Treasury Seeks Information Concerning Motor Trucks Needed by Various Departments.

The secretary of the treasury, on behalf of the United States government, through the medium of the general supply committee, has called for bids on both gasoline and electric motor trucks. Under the law the secretary of the treasury is charged with the duty of contracting for supplies common to the needs of two or more departments and it is under this authority that he conducting the negotiations relative to these vehicles.

It is not known how many the government is to purchase during the fiscal year, but it is understood that the coming order will be for not less than is; or seven cars, for various departments. It is probable that the contract that the secretary enters into will cover all the trucks that will be required during this fiscal year. The treasury department will purchase three of the following capacities: One and two tons, and probably one from 1000 to 1500 pounds.

METROPOLITAN HAULAGE WITH ELECTRICS.

How the New York Edison Company Utilizes a Fleet of 99 Wagons, Trucks and Carriages, and the System of Operation—Practical Service Afforded by Accounting and Record That Economizes Both Expense and Time.

By William W. Scott.

IN THE consideration of haulage by road vehicle system of accounting cost and methods of operation must not be confounded. Both are separate and apart, although they have to do with the same service and equipment. In cost accounting a full understanding of the figures cannot be reached without a knowledge of the installation. If it includes a modern garage, the best of facilities, expensive vehicles, attractive appearance, careful upkeep and maintenance, the employment of experienced and dependable drivers, every item of expense, from overhead to incidentals, will be larger than were the purpose obtaining work at the least cost. But beside this there will be the nucertain element of vehicle endurance unless there is a positive manner of upkeep.

Delivery or haulage efficiency is entirely depend-

enue or expense and to indicate the differences with relation to each service so far as local conditions were concerned, but it would not clearly indicate efficiency.

The methods of transportation must vary according to the needs of the business. The requirements must be left to the judgment of the executive. Efficiency cannot be measured by statement of expense only as applied to the subject under consideration. But it is evident that a high standard of maintenance and upkeep is productive in that it insures the continuity of service and a minimum number of vehicles, it being assumed that there is dependence upon the practical use of machines when the demands are in excess of normal. The motor wagon may be worked as many hours a day as are necessary by the use of extra drivers and at the expense of such supplies as are re-



The Abandoned 42nd Street Ferry House Now Used as a Temporary Garage by the New York Edlson Company, Showing the Charging Panel—This is Practically Deserted by Day.

ent upon administration and the condition of the vehicles in service. The system must be such as will insure economy. It is not possible to conceive methods that will be equal in results with two similar services. even from locations side by side, over the same highways and serving the same people. For this reason each subject must be regarded separately. Were there a uniform system of accounting it is certain that there would be material variation in detail established. For the nursose of comparison standard haulage accounting would require analysis of each service, as costs differ materially and efficiency cannot be shown without fixed rates for work performed. It would be manifestly impossible to determine such rates. Were it possible for uniformity in method of accounting the chief advantage would be to include all items of rev-

quired and the actual wear of service.

The economic possibilities of electric vehicles and the practical value of systems are demonstrated very conclusively by the transportation department of the New York Edison Company, which has in its service 104 motor vehicles, of which but the are gasohine. The cost of the division is large and the aggregate expenditure is such as to justify the closest attention. But in considering this service it should be stated that the company is exceedingly broad and liberal in its relations with its employees. It considers their welfare at all times and has instituted or promoted among them activities that are in every way beneficial. For instance, there is a benefit society in which members are paid stated amounts during illness, or their families receive specific sums in the event of death. The



Portion of the Moin Floor of the 41st Street Gorage, Where Light Wagons Are Stored der Henvy Vehicle Tops Suspended Rendy for Use-A Scene at Might.

employees may borrow money for building homes and repay the principal in convenient installments, the services of physicians are provided without expense, and where uniforms are desirable, as in the case of the drivers of the motor vehicles, these are provided by the company. This policy has given the company an exceptionally dependable class of employees and it has a waiting list of applicants in practically every department. This statement is made to show that the economy the company seeks is compatible with the quality of service it desires to maintain, and a financial statement would not be a just basis for comparative judgment.

The New York Edison Company is the largest corporation in the world selling electric light, power and heat, when measured by capital, and its service, while confined to the boroughs of Manhattan and the Bronx, is correspondingly large. There may be companies that cover a larger area, but none of them has a similar volume of business. The principal station is located at what is known as the Waterfront, where the power is generated, and it is sent out at high voltage

to the 31 sub-stations, where it is converted to low voltage for lighting, power and domestic purposes. It may be said that the commercial service of the company extends to practically every street in the two boroughs. The number of lamps in use is approximately 5,250,000, and a volume of energy equal to lighting them is supplied to customers for power and other uses. The demands are practically continuous, though of course varving.

The distribution of current is by cables, largely laid in conduits, or carried on poles and buildings, and besides the maintenance there is new construction proportionate to the growth. Centring at the main station the city is cobwebbed with cables and wires, generally underground, and the distributing system is being extended daily. This work is in all sections, and to meet the demands of the customers it is necessary to hand a great deal of material and tools, while the volume of supplies furnished is constantly increasing. For instance, the company furnishes the lamps used by its customers, and it has salestooms where lighting fixtures and all

forms of electrical household and store utilities are sold, which are delivered to purchasers. It is necessary for officials of the company to visit work and to meet customers, and transportation must be provided for them. Construction material and all forms of equipment must be hauled from the manufacturers or from the shipping terminals, and shipments must be delivered to the docks or express and railroad receiving stations. Besides all this there is the incidental work of differing natures, and the street lamps must be observed and kept luminous, no matter what the weather conditions.

The executive and administrative offices of the company are at Pearl and Danie streets, but the main garage is located in 41st street, near First avenue, in a building that was at one time a boiler house. The property of the company occupies practically an entire block, in which, besides the garage, is a large machine shop and a blacksmith shop. The company uses a building at the east end of 42nd street, that was formerly a ferry house, for vehicle storage, and at 108th street and at 140th street it keeps a few wagons at the



Truck Division of the Main Floor of the 41st Street Garage to the Evening-Machines Londed and in Bradiness to Start to Complete a Construction Haminge Job,



Hydraulic Lift on the Main Floor of the 41st Street Garage Lowering a Buttery from an Understang Box.

sub-stations. The company has planned the erection of a garage building sufficient to house all its vehicles and provide for a reasonable expansion, but this has not been undertaken as vet. At the 41st street garage 49 wagons, trucks and pleasure cars are kept, five of these being small gasoline runabouts. There are a number of cars housed there that are used by the officials of the company, while the remainder are wagons and trucks of different capacities. At the 42nd street garage 31 wagons and trucks are housed. At the 108th street sub-station there are 10 wagons and trucks and at 140th street three wagons, while seven wagons now charged at the 41st street station are kept standing in the street, and during the day four wagons are charged there that are used during the night. This makes a total of 60 vehicles that may be considered attached to the 41st street garage.

The company has owned and operated electric vehicles since 1901, when it purchased two, and its fleet

now includes machines built by the Electric Vehicle Company, the Vehicle Equipment Company and the General Vehicle, Baker, Babcock, Lansden Anderson and Walker companies. These are of 700, 1000, 2000, 3000, 4000, 7000 and 10,000 pounds capacity. Included in the equipment are eight surreys that are used by the officials, which are of different ages, and there are a number of surrey chassis adapted for wagon bodies that are used for haulage. The wagons are both open and closed and some are fitted with platform and others with express bodies. The trucks are in some instances equipped

with high stakes and tops are built with bows that telescope over the tops of the stakes. The tops are provided with curtains that may be rolled, that are attached to them. These tops are kept on slings above the spaces in which the vehicles are stored. and may be lowered and installed in a very brief period when needed. This affords in a broad sense both open and enclosed bodies on the same vehicle, and permits a more diversified use than with a permanent top, Usually the machines so equipped are of the large sizes and are

frequently used for hauling loads of unusual bulk, or are specially fitted for construction work.

In the 41st street garage is the battery room and the repair shop. Here all the maintenance work is carried on under the direction of H. T. Cameron, superintendent of vehicles, whose office is in the building. He has a force of 27 men busy during the day and another of 14, supervised by a foreman, at night, The garage is not equipped for heavy machine work, for this has been done at the adjacent large shop of the company, and as compared with similar stations it is apparently lacking in equipment, but the facilities are excellent despite the absence of large power tools. Here in a stock room is carried a supply of all parts ordinarily required, although for the older machines it is necessary at times to make whatever may be needed, while with some of the vehicles changes have been made that make special work necessary. For instance, where plain bearings were originally used



Buttery Removed from a Machine with the Hydraniic Lift in Position for the Placing of Rollers by Which Batteries Are Handled.



Battery Room of the 41st Street or Main Garage of the New York Edison Company, Showing the Charging Panel.

roller or annular ball bearings have been fitted, and where machines have been adapted for different work than intended by the builder they have been strengthened.

The purpose of the company is to have its machines available for service if it is within the capacity of the garage shop to keep them in operative condition. This may appear to be a very broad statement, but a wagon converted from an old surrey was shown the writer that had been overhauled and repainted in two days. The restoration represented the work of six men during the time stated and Mr. Cameron said that his ambition was to do the same work with double the workers in a single day. But despite the haste with the machine it was regarded as being in first class condition for the service required of it.

The statement has been made that the company requires a high standard of maintenance, which the quick restoration appears to controvert, but it may be well to make clear that the machines are so well kept that the work was minimized when compared with the requirements of a vehicle driven until it is in "need" of repair. Not only this, but the parts needed were in readiness, and when the work was begun it was with the sole purpose to complete it as quickly as possible and no form of delay was permitted, for the vehicular equipment of the company is by no means as large as might at times be utilized, and the entire system of work depends upon the wagons being always being always

serviceable. It may seem strange to many to learn that if more than a single wagon is out of service at any one time the entire working schedule may be regarded as retarded. That is to say, that the service of every available vehicle is required and the superintendent of vehicles is expected to have each one in readiness for use. This is the reason for the seeming rush in repairing. Of course it must be admitted that the painting is not equal

for such wagons as are referred to it is a solid color with a single coat of varnish. Yet mechanically the wagon was in every way up to the stand-

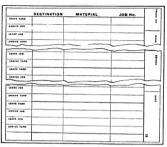
Emphasis has been made of the requirements of the company as to service to show that the condition of the machines must at all times be excellent. If vehicles are idle this means a decided delay of the work in the varying departments, the inconvenience of customers

and retardation of the plans of the entire organization. The garage workers are busy at all times. When a wagon is withdrawn from use repairing is done by day, but a great deal of the care given at night is in the form of adjustments and minor restoration. It may be said that it is only by careful oversight and constant attention that the standard of maintenance can be attained. It is very improbable that there is another vehicular equipment of similar proportions in use anywhere that will show so small a loss of wagon service.

With the New York Edison Company the duty of the superintendent of vehicles is to provide the machines each day and to maintain them. The transportation department receives the requisitions for haulage from all the other divisions of the company and it assigns the work for each driver and each machine. This schedule is so prepared that when the men report at the garage at night with their machines there is posted on a board an order for the work for the following day for each man. The orders are in envelopes and are expected to be read. The envelopes and the orders remain as posted until the next morning, so that should there be a reason for the failure of a driver to report, as from illness, the driver assigned to the vehicle will have the order and the work can be taken up without delay or misunderstanding. Of course the transportation department is informed by the superintendent of vehicles as to the condition of



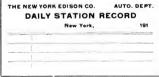
to what might be desired, but Another Section of the dist Street Garage Battery Hoom, Illinatrating the Facilities for Doing Efficient Work.



Porm A-"Job Card." Eight Inches Length and Pive Inches Width, on Card, Printed in Black on White on Both Sides; Enda Nutched for Filing.

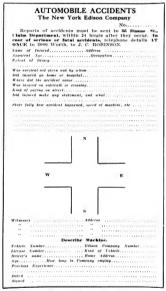
the machines and the number available for each class of work. If special equipment is necessary for the vehicles it is ordered and is ready when they are sent out. In the event of special or emergency work the transportation department makes whatever changes are necessary in the schedule for the day to meet the condition. There are times, of course, when extra work is required of the driven sand the machines must be driven beyond their battery capacities, but there are 22 stations about the city where the batteries may be "boosted," in addition to the regular charging places of the company. The company does not require extra work unless it is absolutely necessary.

The garaging, as has been stated, is at four stations, in 41st, 42nd, 1(8th and 140th streets, and the wagons assigned to the different garages are regularly kept there at night, being washed, oiled, greased, charged and inspected, and wherever work is necessary this is done at the 41st street garage, where it will be supervised by the night foreman. There are four machines worked at night in the "trimming" department that are given attention during the day. All the wagons used in regular work are assigned and the drivers are given orders regularly. In the accounting a charge is made for service of any kind against the department for which the work is done. For instance,



Form B—"Daily Station Record," 12.5 Inches Length and 5.5 Inches Width, Printed in Black on White, with Red Longitedium and Blue Transvers Builds.

if a surrey is used by one of the officials his department is charged a stated price for the service, so that each division pays its proportion of the cost of the transportation, and at the termination of a given perriod the maintenance is divided proportionately with the work actually required. Naturally each executive desires to minimize expense and consequently the work is economized. Obviously prices for work performed could not be compared with similar work in



Form C-"Accident Record," 15 Inches Length and 8.5 Inches Width, Printed in Black on While and Light Bine Papers, Padded for Carbon Duplication.

other cities. Transportation conditions in New York differ from those of other municipalities and it would not be possible to base judgment on statements of cost. Neither would it be practicable to place the charges for work at parity.

The system of maintaining the vehicle department is of more than ordinary interest. The methods will be followed so that the general manner of use and the records can be considered sequentially.

When a new vehicle is received by the superinten-

275			DAILY REPORT FOR CHAUFFEURS	
VI H-CLE	TOIP	TOTAL	COMOTION OF VEHICLE	CHAUFFEUM
103				
420				
			DATE.	191

Parm D-"Bully Report for Chandlenys," 27 Inches Length and 13.25 Inches Width, Pelated in Black on Yellow, with Numbers of Validates Grand by State of Machine Build for 25 National Build.

dent of vehicles at the garage it is weighed and measured, and the information indicated in form K is supplied, this being known as a "guide card." The machine is assigned a number that is used as a designation in all work and in all records. This includes the machine number, manufacturer's number, type of vehicle, capacity, name of the manufacturer, wheelbase, tread, color, weight, overall dimensions, including length, width, height and loading space; make of motors, type, voltage, amperage and speed; make of battery, type, number of cells, number of trays or crates, number of sections and weight; tires (whether solid or pneumatic) and the sizes of the front and rear wheels: the date the machine was received from the manufacturer and the date it was placed in service. To this is added the number of the license, the state in which the license is issued (some machines are licensed for New Jersey as well as New York) and year. The vehicle is inspected and tested and is then ready for use.

As stated, the orders are received from the transportation department and are posted on a board under the numbers designating the vehicles, and each driver is under normal conditions assigned a machine regularly. At the hour for reporting, either day or night, the driver notifies the timekeeper that he is ready for duty and receives a card bearing his name and the time he had reported stamped on it. He also receives a card indicated as form A, on which he is to note all the stops he makes with the machine during the day. This card will permit 14 different entries, showing when he leaves the yard (if material is hauled), when he arrives at the job, when he leaves the job and when he arrives at the yard, or one complete trip, and this also indicates the periods taken for loading and unloading. The card further shows the destination with each load, the material hauled and the number of the job on which he is working, for construction is designated in this manner. This card further shows the number of the vehicle, the make, the name of the driver and the date. This card is in form for filing.

As the driver leaves the garage he calls to the timekeeper, whose office is at the main entrance, the number of his machine and his name. These are noted by the timekeeper on form B. This record does not complete the purpose of this form.

In the event of an accident in which the driver or his vehicle have become involved during the absence from the garage the driver immediately notifies the office of the superintendent of vehicles, and having secured the information that is required he later makes a full report in writing on form C, which he signs and turns over to the superintendent, who transmits it to the claim department.

At the conclusion of the work for the day the driver returns to the garage and as he passes the office of the time-keeper he calls his name and number of his machine, which the timekeeper notes on form B. The timekeeper may make note of any condition that may be evident or which he may believe is essential. The driver leaves his machine and deposits the form A card at the office. This shows his work for the day

	AILY REPORT	AUTOMOBILES OU	T OF COMMISS	ION		19
EHICLE No.	CLASS OF REPAIRS	OUT OF SERVICE	ELAPSED TIME	TROUBLE	REMARKS	
_			~			_
\sim						
					wetten	
SPECIAL P		E IS TREEN OUT OF COMM-8810H TO			MHEELD AGES TIGGS	
BREAKDOI	EPAIRS-WHERE VEHICLE VM REPOIRS-WHESE VI		MARE 6000 SPECIAL FAUL		WHIELD AGLE TIMES OFFINDS STEETING GRAD	
BREAKDOI	EPAIRS-WHERE VEHICLE VM REPOIRS-WHESE VI	E IS TOKEN OUT OF COMMISSION TO	MARE 6000 SPECIAL FAUL		WHITE-B ASLE TIMES SPAINSS	

Form E-"Daily Report Automobiles Out of Commission." 8.5 Inches Length and II Inches Width, Printed in Binck on Yellow; Raied for 20 Enteles.



Form F-"Milenge Record of Electric Vehicle Batteries," 12 Inches Length and 18.5 Inches Width, Printed in Black on Vellow: Ruled for 43 Entries.

and it must be filled out in every detail. The driver finds at a desk the sheet form D, on which is entered the mileage for the day, the condition of the machine (whether it does or does not need attention as he has observed from operation), and signs his name. This record is before the night foreman and from it he plans the work of his department. If a vehicle should become disabled from any cause during the day the driver notifies the superintendent, who upon notification sends an emergency wagon with a mechanic and the necessary parts or material to make restoration. If it is possible to do so the machine is repaired and work continued, but if the damage is beyond a street repair the machine is towed to the garage. The transportation department makes the necessary provision for the work.

Cessation of work of vehicles from accidents or failures at which are entered on form D and in addition are entered on form E, which specifies the facts, giving the number of the vehicle, class of repairs, the period when out of service, the elapsed time, the cause of failure, and remarks. The form establishes designations by which varying work and components are regularly entered on the forms. As has been stated the driver makes report of repairs, alterations or adjustments to the timekeeper, and these are entered on form B as well, so that the leaving and returning sheets of form B very well establish the period of service and the condition of each machine for the day.

From form D the daily mileage of each vehicle is transcribed on to form E, which is a mouthly record, and this gives the total for the mouth for each machine and the total for each day and for the mouth for the entire number of machines in service. A similar record is kept of each battery mileage, the batteries being designated by number.

After the vehicle has been returned to the garage it is washed and placed on charge. A separate record is made for each machine and this includes the entries as shown of the charging plug number, battery number, date, vehicle number, present and previous wattmeter readings, the difference between the wattmeter readings of record, the current consumption, the time of charging and the voltmeter and ampere meter readings, these readings being taken hourly during the period of charging. Forms II and I are the records

of the tires. As the solid tires generally are kept on the wheels to which they are first installed it is possible to fully account for service by assigning to each tire a serial number which is stamped on a brass tag that is attached to the fellor of the wheel. Each wheel is numbered and each wheel is used, with rare exception, on the vehicle of which it was originally a part, so if a wheel should be temporarily used on another machine its mileage and its service is always recorded. As a tire number is never transferred a record can always be followed correctly. Form H is known as the "tire time card," and when a vehicle is new the record shows the serial number shown on the tag on the wheel felloc. Where pneumatic tires are used only the maker's serial number is entered on the eard. Form I is the "index eard' 'and this contains the full infor-

031-36-3 3036-8-11	C	HARGIN	IG CAI	RD.	
T	HE NEV	YORK	EDISON	COMPAN	Y.
		AUTO.	DEPT		
PLUG NO		_	BATTERY I	No	
		DATE			
CAR NO	OR NAME				
PRESENT	WATTMETE	R READING			
PREVIOUS		DO			
DIFFEREN	IC E				
CONSUMP	TION				
A. M.		P. M.			
TIME	AMPS.	VOLTS	TIME	AMPS.	VOLT
				-	1 -
_		-		-	-
REMARK					-
	DAY	CHARGER			

Form G-"Charging Card," 8.5 Inches Length and 3.5 Inches Width, Printed in Black on White Ruled for 12 Entries.

on ma		Tires in	200 00 Yeb	icte No.				Tire No		s	ice	X	. Marriaga	Used or	1.	10.074 10.	
From:	Enpet	Right	Repr	Regist Expet	Lall Fepat	Right	Lett		hesed				No. No.			r No.	
				_				Mahar's No.	Date Reset	Vehicle No.	Position on Vehicle	Date on Vehicle	Date off Valuets	Misage	Way	Service	Remarks

Form 11-"Tire Time Card," Four Inches Length and Six Inrhes Width, Frinted in Black on White, with Red Head Rulling, on Both Sides.

mation, including the tire number, the slze, the make, the type of vehicle on which it is used, the date purchased, the requisition and the order numbers, the maker's number, the date reset, the vehicle number, the position on the vehicle, the date of installation, the date of removal, the mileage, the reason for removal, the number of days in service and remarks. Reference to form H will indicate the manner of use of any tire on a given vehicle, and form I will show the desired information relative to a tire during its entire period of use. The entries on the cards follow the tire wherever it is used and the mileage and number of days of

Form J is the repair report, on which is noted all adjustments and restorations, and as each machine is overhauled thoroughly once a year, this record is of the minor work. But which is essential to know to establish service and cost.

use can be given with reference to any shoe.

Form K is the record to which reference has been made, and on the reverse of this is noted the monthly mileage and kilowatt-hours current consumption of the vehicle. The card will permit entries covering five years, and this affords sufficient detail for comparison of work and current cost to meet all reasonable requirements. When this card is filed the record of repair and the work of any character on the vehicle is filed with it, so that it is possible to obtain instantly any information relative to repair during the period the machine has been in service. The entries on form J are copied from the notes on form B, or the section of that report that deals with renairs.

Form M is the battery record, which is exceedingly complete. It will be seen that this covers the details of type, make and construction of the battery, the repairs, mileage and current consumption, so that it is possible to make exact comparison of the work accomplished with any one battery or type. This record Form I-"Tire Index Card," Frant Inches Length and Six Inches Width, Frinted in Black on White, with Red Hend Ruiling, One Side.

is regarded as of extreme importance, for by it the value of a battery with reference to cost, work and expense of operation and maintenance can be determined with great exactness. This card has been recently adopted and is the result of more than 10 years' experience with battery service.

The battery room of the garage is large, but it is not sufficient in size or equipment for the work done by this department and is for that reason crowded. The batteries of the machines are generally of the undershing type and they are put into and removed from the machines with a hydraulic lift, which is illustrated. The vehicles are run over the platform of the lift, on

Car No.	Repair Report
Dete	Dete

Form J.--"Cur Repair Report," bix inches Length and Eight Inches Width, Printed in Black on White, and Raied for 21 Extricts in Each Column.

which is placed two boxes at the distance apart to take the ends of the bottom of the battery box carrying the battery crates. The lift is raised by a hand pump to the height where the bottom rests on the boxes. The rods securing the crates are removed and the battery is lowered to a level where rollers can be placed under the box bottom and it can be rolled into the battery room. Heavy iron channels are placed at either side of the lift pit when the tread of the vehicle is narrow. By a reversal of the operation the battery, or another battery, is installed in the vehicle. With this apparatus, though it might be greatly improved, a battery can be changed by two men in perhaps five

Car No. Migr's No	1	MILE	AGE S	MU	MARY,	CAF	No.				
	Year	19	19	10	19	179	119	14	19	10	1 19
	1	46.63	8.70 (00)	MARK	4 W 1085	MI ES	4. 9. 1985	900.5.0	5 W 1022	MEET	
rpr Capacity MBg d by	Jan.									-	-
Neel Base Tread Cate Wages	153.	-	1	-	-	-	-	-	1	+	
roral Donosano Lough Wath Hoght Lording Sport	Mark.		1					-		-	-
man Main Type Vots Servel	1	-		-		-		+	-	+-	+-
ney BundNo Colo. No Trops. No Sentine Wright	AFR.	-	-	1		-	1				-
en (harry) San - Front Rev	8643			_		-	-	-	-	-	-
or d Iron Mig is Put ats Companies.	-	-	4	-	4	-	4				
Town St. San Day Lorent St. San Paul Laure St. San Day Lorent St. San Day	-	-	1		-	-			~	-	1-
	29,75		-	-	1	+				1	
	184	1						-			
	9	-	-	-				-		+	+-
	101A					-		-	-	-	-
							1	-	all -	_	_

Form K-"Guide Card," Six Inches Length and Eight Inches Width, Printed in Black on Salmon; Three Rules for License Entries and Five Lines for Remarks; the Obverse at the Left and the Beyerse at the Right.

111-77-	,,										VE	HICLE	BATTE	AY D	ATA				BATT	ERY No.	
le constitue de la constitue d	_		TH	IÇKH	£\$\$ C	OF.				DIMEN	HONS	QF				WILIGHT O	F	STYLE	Disc	MOE 30M	
STAG	TYPE	CELLS	PLAT	£S	SEPA	RATE		11		ANS		TRAYS			COMPLETE		130 S.G	AND NO.	RA	TE	
			POB.	NEG.	I,w.	R.	L	w.	- 84	8/35	WALL	L.	w	=	E8.4	BATTERY	0.24	OF TRAYS	AMP.	49.0	
																		1			
											1								1		
-	-			-			-			-											
												-									
									1						1	0					
_	-	M	AINTA	INA	NCE			-	_	MIL	EAGE			T	-	C	HARGI	NG CURI	RENT	CONSUMPTION	
			REP	LACE	D		\neg				TO	JAT		1	K. W.	н.	K. W.	H. CONSI	UMED		
	PLA	16.6	BEFR	AATO	NO 3	TP GRA	ars	MONTH	LY	P35			NEG.		PER		DURIN	IG THE LI	FE OF		
	POS.	REB	w000	ALC:	BEA		7	derd Mich	12	D4+9	#11.1 T	pers	m1, 0		HINGH	DL C	PDS		810		

Farm M-"Battery Card," Six Inches Length and Eight Inches Width, Printed in Black on While; Raied for 16 Entries Under

minutes. The apparatus economizes time and facilitates the handling of the batteries, some of which are exceedingly heavy.

The method of accounting for the time of the workmen is simple. When a workman reports for duty be is given two cards, the one a day eard and the other a job card. The day card is stamped immediately and is again stamped when he has fuilsted for the day.

[c			9.5			. P.
Line Embross	1		9784	780	3	2. my
LOCATION						
/00 ms	8VB No.	8 CH 74		BATE	AMOUNT	8 KPEN08
ť.	. 5					

Form N-"Workman's Job Card," There Inches Length and Five Inches Width, Printed in Red on White; Time Stamps Are in Blue,

The job eard is stamped when a work is begun and when it is completed, and the aggregate times shown by the job cards must coincide with the total of the day card. The job card accounts for the two working periods of a day when the work continues for that length of time, and other necessary details, such as the operation, the location and the expense attached, and from this the timekeeper makes out the pay of the mechanic for the work, which is entered under the heading "amount." One, or a series, of these will serve for a day and the aggregate will be the amount of pay due to the workman. Failure to account for time properly means loss to the workman, and if there is a period unaccounted for an explanation is required. The card is the voucher for the expense as well as the worker's pay.

Materials and parts are requisitioned by the superintendent or the night foreman as required for any work, and these are made in quadruplicate and designated as for body or chassis, giving the job and the vehicle numbers. Three of the copies go to the store room and one is retained by the garage office. At the store room the prices and the total are filled in. The requisition prices account for freight, cartage and supply room labor. The requisitions are signed by the clerk delivering the stock or material and the receiver.

The detail required in the forms may appear considerable before the system is understood, but even a casual examination will demonstrate its simplicity and its efficiency, because no essential fact is lacking and every factor in operation, maintenance and expense can be learned when desired. Each record is available and complete and its accuracy is unquestioned.

The system has been developed by more than 11 years' experience and it may be said to be sufficient to meet the requirements of a corporation that must of necessity be earefully systematized. The actual haulage is directed by a single head. There is never confusion or uncertainty, and the work is so well organized that as a rule the office is generally a day ahead of the vehicles.

This system permits meeting any emergency demand without affecting the organization materially, and with the elasticity of the service it is possible to meet requirements as they arise without complication.



Form (1—"Requisition" Blank, 9.5 Inches Length and 5.5 Inches Width, Frinted in Black on White, Yellow, Orange and White Paper, for Weiting in Quadrappleate, the Second and Fourth Sheets Beling Marked "41" and "File" Lengthwise of the Page Ruled for 19 Katelen.

TWO-TON TRUCK ADDED TO ADAMS LINE.

A NNOUNCEMENT is made by the Adams Bros. Company, Findlay, O., of a new two-ton truck to be known as model E. which will supplement models A and D of 2000 and 3000 pounds capacity, respectively. The new machine will embody the same high grade material and workmanship noticeable of previous cars and with the exception of those modifications necessary to care for the stresses of greater carrying capacity, the new chassis will be constructed along those lines which have proven the efficiency of the Adams design.

The Adams Bros. Company is well known in the machinery world, having been prominent as a manufacturer for over 40 years and its plant is unusually well adapted to the production of high grade motor vehicles. The company made a special study of The motor is a four-cylinder, four-cycle, watercooled unit, east en bloc, although it has the appearance of single units in that spaces are provided between the base of each member. A special grade of gray iron is employed and the casting is seasoned before finally being fuished. By the utilization of a special machine each cylinder is accurately bored, then ground carefully to exact dimensions, and the mit is subjected to a careful inspection.

825

The pistons and rings receive as careful attention and are constructed of a special cast iron. The piston is ground to an accurate fit in the cylinder while the rings are ground on all working sides. The terankshalt is 3.5 per cent, drop forged nickel steel and its diameter is very liberal for the size of the motor. It is supported in three long hearings which are of a



Adams One-Ton Chassis Fitted with Farniture Body-The Company Also Manufactures 1.5 and Two-Ton Models.

transportation problems before entering the automobile industry and has incorporated in the chassis design those components that make for simplicity of operation, durability and consequent low cost of maintenance. In the matter of accessibility the designer has taken into consideration the fact that many drivers care for their own machines and has provided casy means of reaching those parts requiring attention. As the new chassis represents the same constructional details as the smaller models, a description of these will apply to the large ear with the exception of wheelbases, springs, tires, etc.

With the exception of tires and accessories the Adams trucks are constructed in the plant at Findlay, O., and all parts are subject to rigid inspection before and after being placed in the chassis. The limit of measurement is very fine and the tests of the motor very exacting.

special composition. The camshaft bearings also are of liberal size and all bearings are accurately fitted and run in, after which they are readjusted, a practise making for long service with a minimum of attention. The camshaft is drop forged with cams integral, is located in the upper half of the crankcase and is actuated by spiral gears, these being accurately cut and meshed, making for silent operation.

Cooling.

One of the noticeable features of the motor is the library size of the water jackets, which are cast integral. The outlet manifold is a one-piece casting which is easily removed, permitting of access to the top water jackets, while either end of the motor has large sized removable plates. Drain plugs, located at the bottom of the water jackets, permit of completely removing all fluid, thereby presenting opportunity of freezing during low temperatures.



Presenting the Compactness and Accessibility of Motor and Method of Mounting Radiator on Dash.

Circulation is effected by a centrifugal pump actuated by a spiral gear and located in front of the engine. The cooled fluid enters the water jacket at the forward end of the motor, passes around the valves to the top of cylinders, thence to the radiator. The latter follows foreign practise in that it is mounted forward of the dash, a design protecting it from possible injury through collision when operating in crowded traffic. A vertical tube type is employed and the cooler is mounted on flexible supports, eliminating the possibility of straining through frame stresses or when traversing rough roads. A feature of the radiator is the utilization of two filler caps of liberal size. This permits the replenishment of the water from either side of the car and of completing the work in quick time. Cooling is further aided by fan blades cast integral with the flywheel at rear of the motor.

Horsepower Rating.

All motors are of the L head type with valves on the right, and have a bore of 3875 inches and stroke of five, the horsepower being rated at 30, which the maker holds is ample for all conditions of service. The unit is bolted to the upper crankcase, which is of a high grade aluminum, while the lower half serves as the oil reservoir. Two large webs on either side of the main crankcase support the power plant on special frame members.

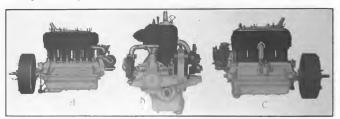
Lubrication is by a combined force feed and splash system, a constant level being maintained by a gear driven pump, the components of which are easily accessible for cleaning or inspection. Several drain plugs in the bottom of the lower crankease make it a simple matter to remove the old lubricant when desired. An oil gauge denotes the level of the lubricant,

Dual ignition is provided, a high-tension magneto and batteries being standard equipment. The magneto is located at the forward end of the power plant and is driven off the eamshaft through an Oldham compling, as is the water pump. Directly over the gears actuating these members is a large filler formed so that all oil poured into the crankease fhoods the gears with lubricant. The gears are accessible through an inspection plate, and the pump and magneto, as well as the driving mechanism, may be disassembled and replaced easily. The high-tension cables from the magneto are carried to a special tube supported by the outlet water manifold and a noticeable feature of the wiring is the shortness of the leads and protection from possible contact with metal or lubricant.

Carburetion.

A model L Schebler carburetor is employed and is located at the left of the motor. A noteworthy feature of construction is the intake pipe, this being very short and straight, eliminating the opportunity of condensation of the mixture in cold weather and making for easy starting. The intake pipe is holted to the motor in which are east the intake passages, a design facilitating earburetion and making for economy of fuel.

The spark plugs are located over the intake valves,



Accessibility and Simplicity Arc Noteworthy Features of the Adams Power Plant: A. Valve Side of Motor: B. Front View.

Showing Location of Water Fump. Magneto and Oli Filler: C. Intake Side, Indicating Well Designed Intake Pipe.

while petcocks are fitted over the exhaust members. The valves are liberal in size and their lift is adjustable. The exhaust pipe is free from bends or curves and being of ample diameter back pressure is reduced to a minimum. The muffler is located on the right, being secured to the frame. All components of the power plant are easily accessible by lifting the hood, as will be noted from an accompanying illustration. The bearings may be inspected or adjusted easily through a large sized plate on the left hand side of the upper crankcase, and the driving gears are equally as accessible.

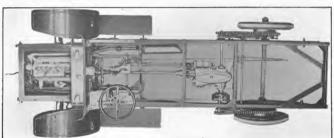
Dry Multiple Disc Clutch.

A dry plate multiple disc clutch is employed and the maker points out that it requires no attention and that its engagement is easy. The transmission is of the selective type, providing three speeds forward and reverse, and the gearbox is a unit with the jackshaft. The inspection plate is unusually large, permitting access to both the gearset and differential. The housdrop in the centre. The rear axle is of the rectangular section, a Sheldon, and the maker points out that it will withstand the most severe service.

On models A and D the front springs are semielliptic, 44 inches long and 2.25 wide, having eight leaves, which are ground and polished. The rear members have 11 leaves, are 44 inches long and 2.5 wide. On the model E the length of the rear springs is 50 inches.

The wheelbase is 121 or 136 inches, while that of the largest machine is 140. The tread is optional, 36 or 60 inches. Wheels are of the artillery type of carefully selected hickory. Model A is fitted with 36 by 3.5-inch solid tires in front and 36 by four in the rear. The equipment of model D varies in the rear wheels, they being equipped with 36 by three-inch dual tires. Single members, 36 by five-inch, are optional. Model E utilizes. 36 by four inches in front and 36 by 3.5 dual in the rear.

Two sets of brakes are provided and both have



Plan View of the Adams Chassis, Illustrating Simplicity of Design and Accessibility of Components.

ing containing these members is secured to a substautial cross frame member by two arms and the design makes for a three point suspension.

The drive shaft to the jackshaft is of a special alloy steel and universal joints are provided to take up any variation in alignment which may result when the track is traversing rough roads. The jackshaft is of liberal size and carries the service brakes, which are of the contracting type. Final drive is by roller chain,

Frame and Axles.

The frame is of special grade pressed steel, 38.75 inches wide, is offset between the front wheels and is of generous U section. The cross members are also of liberal dimensions and the rear portion of the frame is securely braced. The control lever quadrant is mounted on a sub-frame which also serves to support the steering column.

The front axle is of the I beam section type, of liberal size, and is provided with the conventional liberal frictional surfaces. The service members are located on the jackshaft and are actuated by pedal, while the emergency members are on the rear wheels and are operated by hand lever. Equalizers are provided and either set of brakes is adjusted easily.

The gas and spark control levers are mounted upon the steering wheel and a noteworthy construction of the actuating rods is that they are straight and free from joints and connections, eliminating opportunity of lost motion. The steering gear is of the irreversible screw and mt Ditwiler type and is located on the left hand side of ear, a design making for accessibility to the seat as well as permitting the operator a clear view of approaching vehicles. The control levers are in the centre at the right of driver and an accelerator also is provided.

The fuel capacity is 15 gallons and the equipment comprises two oil side lamps and tail light, complete set of tools, jack and horn. The standard color is battleship gray, but option is given in the painting. The company manufactures a number of standard bodies and is prepared to build special bodies to meet the requirements of the trade. Prices and sketches will be supplied upon application. The standard body length for the 121-inch wheelbase is eight feet, 9.5 inches long by three feet, 9.5 wide. The maximum

BODY CONSTRUCTION ON STEWART.

Maker Pays Particular Attention to the Requirements of the Individual Purchaser.

That the motor truck manufacturer must pay particular attention to the demands of the retail merchant whom he seeks to interest in his product is the policy that has been adopted by the Stewart Motor Corporation, Buffalo, N. Y., maker of Stewart commercial vehicles. An accompanying photograph indicates the extreme care and attention that is given to the rare red of these waxons.

This is of the full panel type, and it will be noted



Hinsteading Rear End Construction on Panel Delivery Body Filted to Stewart Chassia.

that the grating at the rear is hinged and fitted with a support which holds it up out of the way when desired. The tail gate is wide, closing up the lower third of the body and meeting the grating. The chains supporting the gate are enclosed in a leather cover to prevent them from marring the finish of the vehicle.

In commenting upon this construction President T. R. Lippard says: "The time is past when a manufacturer could put any kind of a body on any kind of a chassis with the expectation that retail merchants would buy it. Nowadays we have to provide the very best kind of carriage work, the handsomest finish, the best looking design, and every detail must be perfect. And this is right, for a commercial ear is a moving advertisement for the store that uses it."

The Magua Automobile Company, Hartford, Coun., has become the selling agent of the Auderson Electric Car Company for that city and vicinity, and a salestroom will be opened at 10 Ford street.

length back of driver's seat of the chassis with 136-inch wheelbase is 11 feet

The Adams Bros. Company is confident that it has net every requirement in simplicity, efficiency and durability and that its vehicles can be maintained at a minimum cost of observation.

PIERCE-ARROW GIVES GOOD SERVICE.

Transportation Company on Pacific Coast Establishes What It Believes to Be a New Record.

An interesting record of service given by a five-ton Pierce-Arrow worm driven truck has just been received by J. B. Livezey of the Commercial Car department of the W. E. Bush Company, Los Angeles, Cal, distributor for the maker, the Pierce-Arrow Motor Car Company, Buffalo, N. Y. The vehicle in question is owned by the Motor Transportation Company of Los Angeles. Since March it has travelled 19,054 miles and delivered 5450 tons of freight. In performing this work it has averaged 52 miles on a gallon of gasoline and 261 miles to a gallon of eylinder oil.

During the last four mouths the truck has been in service 20 hours a day. In September it covered an average distance of 127.6 miles a day or 3822 miles for the mouth. In commenting upon this performance the officials of the Motor Transportation Company write as follows: "We wish to say that the truck travelled the entire distance mentioned on the original set of tires, which we think, with the other data taken into consideration, makes a record that would give food for thought and by which the Pierce-Arrow worm driven truck speaks for itself."

MORELAND BUSINESS INCREASING.

Pacific Coast Manufactory Experiencing Difficulty in Keeping Ahead of Its Orders.

The Moreland Motor Truck Company. Los Angeles, Cal., produced 27 trucks during October, but is far behind in its orders. When the addition to the factory is completed this condition will be remedied and the company will have 2.5 acres of floor space. That this space is necessary is the highest commendation for the enterprise that delivered its first truck only last January. Twenty-five earloads of material are on the way to the factory and their arrival will greatly help the builder, whose main difficulty has been in securing material rapidly enough. The Caliente & Copper Creek Mining Company, Winkelman, Ariz, has just received a carload of five-ton Moreland dump trucks to be used for hashing ore rhashing ore rhashing ore rhashing ore results.

The 11. J. Heinze Company, Indianapolis, Ind., has made contract for five General Vehicle 3.5-ton trucks, which will be placed in service at the branch at Pittsburg. Penn.

PARCELS POST AND THE TRUCK INDUSTRY.

W 1711 the aunonincement of the establishment of a domestic parcels post in connection with the post-office department has come much speculation as to the possible effect this will have upon the automobile industry, and particularly with reference to the connected vehicle field. This is not without foundation when it is known that a special committee was requested by Postmaster-General Hitcheok to investigate the merits of an International ear, made by the International Harvester Company of America, Chicago, for this work seon after the bill creating the new service was approved by Persident Tail.

Under the terms of the act of Congress, approved Aug. 24, 1912, the postmaster-general is authorized to establish a domestic parcets post, embodying a zone system, Jan. 1, 1913. Oct. 3 the special committee, composed of Robert S. Share, chief postoffice inspector; John C. Koons, superintendent of the division of

salaries and allowances; A. A. Fisher, chief clerk of the office of the second asstant postmaster-general; Clarence B. Hurrey, chief clerk of the office of the third assistant postmaster-general, and George L. Wood, superintendent of the division of rural mails, met with H. P. Gorsuch, postmaster at Westminster, Md., and a number of merchants, manufacturers, farmers and others in that city. The object was to formulate a test plan, which may or may not be considered as worthy of adoption when the new service is put into force.

The International car, shown in the accompanying illustration, was selected for the test, and it will be noted that its fittings were especially adapted to the work. The body is made of galvanized steel and contains several cabinets, each

provided with pigeon holes and large receptacle for newspapers and magazines. They are so constructed as to be removed from the vehicle for carrying into the postofice to be filled or emptied. All cabinets are locked with doublethrow locks, and so constructed as to be absolutely dust, water and burglar proof.

The car was driven by John Didderar and John T. Coppersmith acted as carrier. The route chosen was over one of the worse stretches of road in the county. In lieu of the class of mail matter which will not come into existence until Jan. I, copies of a local paper were utilized to demonstrate the new service. At Frederick, Congressman David J. Lewis, father of the parcels post bill, saw the first parcels post delivery, and was particularly pleased with the car selected for the purpose.

No definite information has been made public concerning the results of the test. It is not known whether or not the postoffice department will decide upon the handling of the new mail matter by motor vehicles. In fact no plans have been formulated as yet. The wording of the bill would seem to indicate clearly that it is intended that the new service shall be extended to the miral and city delivery routes, but whether or not the present carriers on these routes will do the work is onen to question.

The description of fourth class mail matter is extended to include all other matter, including farm and factory products, not now embraced by the first, seeond or third class, not exceeding 11 pounds in weight, user greater in size than 22 inches in length and girth combined, nor in form or kind likely to injure the person of any postal employee or damage the mail equipment or other mail matter, and not of a character perishable within a period reasonably required for transportation and delivery.

The zones are eight in number, not including rural



International Car Utilized in Parcels Post Delivery Test at Westminster, Md.

routes and city delivery within the immediate jurisdiction of the postoffice in question. These are, respectively: All area within a radius of 50 miles, over 50 and less than 150, 150-300, 300-400, 400-1000, 1000-1400, 1400-1800, and over 1800. The fees are set forth in the following table:

	First	Each add.	Eleven
Rural and city	0.6	.01	.15
50 miles		.03	.25
\$0.150 miles		.04	.46
150-300 miles	.07	.05	.57
300-600 miles		.06	.68
6un-1e80 miles		.07	.79
1000-1400 miles		. 10.9	1.00
1400-1800 miles	11	.10	1.11
Over 1800 miles		.12	1.32

Special stamps are to be provided for this new mail service, and special sacks as well. Maps, with the zones carefully marked thereon, are to be prepared for the several postoffices of the country. The accompanying table sets forth what is expected in the way of delivery. The total appropriation thus far made is \$750,000, and the postmaster-general must do all this work with this money. Another appropriation of \$25,-000 has been made for a further inquiry into the matter by a committee of six persons, members of Congress, three of whom are to be appointed by the president of the Senate and three by the speaker of the House of Representatives. More money will be needed as soon as the system is in force.

During 1911 there was expended for the delivery of mail by city carriers the sum of \$35,165,067.58, and for rural free delivery, \$37,145,756.63. In the latter

service 41,559 carriers were employed on 41,656 different routes, with an aggregate mileage of 1,007,772. In 1907, 14,643,129,000 pieces of mail matter were delivered by the United States postoffice department. There does not appear to have been an official counting since that date, but 2,727,295,076 pieces were handled by the rural carriers alone during 1911, and it would appear that the business transacted by the department must have increased materially during the past five years. The postoffice system cost the government 8237,648,926,68 last year.

MANUFACTURERS' CONFERENCE AT DETROIT.

SEVERAL matters of importance were taken up by the National Association of Automobile Manufacturers at its conference in Detroit, Nov. 13-15. While some of these had a more direct bearing upon the passenger vehicle end of the industry, considerable time was devoted to items of interest solely to motor truck producers. Representatives of a number of the large railroad corporations in the country were present to discuss the traffic situation, with particular reference to the matter of providing freight cars for the shipment of automobiles consigned to dealers. Two suggestions were offered as presenting at least a par-

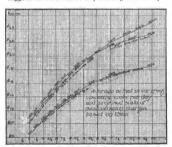


Chart Indicating Demonstration Charges Adopted by National Association of Automobile Manufacturers.

tial solution of the problem, one being more prompt unloading methods on the part of the dealers and the other greater efficiency in handling empty cars by the railroads. It was pointed out, however, that this industry, which requires specially constructed freight cars, has only about 50,000 from which to draw, while others may depend upon at least 3,000,001.

After some little discussion it was decided that the schedule of loody weight allowances on motor trucks, adopted at the March meeting, should be revised so that those which may be made shall be sufficiently large to embrace all ordinary types commonly used in the different trades employing vehicles. Accordingly, the minimum scale was fixed as shown by the following tabulation:

Lond	Schedule	of	Body	Weight Miowances	in	Pounds. Old Allowance
1.000				600		500
1,500				750		555
2.000				900		600
2,500				1,000		
3,000				1.050		790
4,000				1.200		800
5.000				1.350		900
6,000				1,500		1,000
7,000				1,600		1,100
8,000				1,700		1,200
9,000				1,750		1.300
10,000				1,600		1,400
12,000				1,5000		1,600
14,000				2.000		1,×00
16,000				2,100		2.000
18,000				2,200		2,200
20,000				2,300		2,400

Another subject which has been given attention by manufacturers and dealers for some time past is that of demonstration charges, and action was taken at this meeting, which is expected to result in a uniform charge based upon operating costs. It was pointed out that, theoretically at least, the cost a ton for operating a motor truck should decrease as the size of the vehicle increases, and it was held that any schedule of charges for demonstration should bear a definite relation to the actual cost of operation and maintenance. It follows that such charges should be so fixed that the cost of doing a given amount of work will be less with the power wagon than with horses.

It was found that the most elaborate tables of truck operating costs were those issued by the Hewitt Motor Company (now the International Motor Company) and the Knox Automobile Company, and that these agree closely in the average daily costs for motor trucks of two to five tons capacity. These were accepted as a basis from which to determine the average operating costs with power vehicles. The cost of trucking with horses was calculated from the best information at hand. The result in each instance is presented in an accompanying tabulation.

In explanation, it should be stated that the horse figures show the average maximum day's work with animals. The table indicates that it costs twice as much to do the work with horses as with motor trucks, even allowing only five hours running each day with the mechanical transport. If the waiting time is cut down one-half by quick loading methods,

16.0

15.50

	(oat of T	rucking wit	h Hornen.	
Tons	Horses	Daily	Miles a working da	Ton-miles	Ton-mile
1	1	\$5.50	16	16	34.2
2	1	6.50	16	32	20.3
4-5	2	8,50	12	48-60	17.70-14.1
8-10	4	17.50	12	96-120	16.35-14.5
	Con	et of One	antine Mate	- Tours	

	Cont	of Operating	Motor Tru	eks.	
Capacity,	Av. dally cost	Approx. av.	N. A. A. M. speed rating		
. 5			16.6	40,60	
1.0	\$8,58	\$8.50	15.0	75,00	11.33
1.5	9.50	9.50	14.0	105.00	9.04
2.11	*10.53	10.50	13.0	130.00	3.07
2.5	11.48	11.50	12.0	150.00	7.66
3.0	112.20	12.26	11.0	165,00	7.42
3.5	13.18	13.00	10.5	1 N 2.75	7.07
4.0	113.80	14.00	140,0	200.00	7.06
4.5	14.84	15.00	9.5	213.75	7.01
5.0	115.00	15.50	9.0	225.00	6.88

240.00

915 00

6 87

7.04

7.44

17.25 18 95 *Knox, \$10.60; †Knox figures, all other Hewitt.

16 50

its work capacity is increased one-half and the tonmile rate decreased proportionately.

An accompanying chart sets forth in a graphic manner the new schedule of demonstration charges adopted by the association, these being based upon the actual operating costs, with a profit of 25 per cent. The following table not only presents the new scale, but the tou-mile rate in cents:

Schedule of Demonstration Charges.

Truck capacity	Itally cost	Ton-mile rat
June parands	\$10,00	25.0
One ton	10.00	13.3
1.5 tons	11.50	10.9
Two tons	13.00	10.0
2.5 terms	2.4 0101	9.3
Three tons	15,00	9.0
3.5 tons	16.00	8.7
Four tons	17.80	8.5
4.5 tons	13.00	8.3
Five tons	19,00	8.4
Six tons	20,50	×.5
Seven lone	22 00	3,9
Eight tone	23.00	9.5
Nine tons	24,00	9.6
Ten tons	25.00	10.0

At the conclusion of the conference a banquet was held in the Hotel Pontchartrain, at which some 250 were present. During the meeting and at the banquet several representatives of the manufacturers delivered addresses of importance, some of which are given in brief form elsewhere. Among those who spoke was W. L. Day, general manager of the General Motors Truck Company, Pontiac, Mich., who spoke in part as follows:

"A recent evidence of the general trend in transportation is the delivery which has just been made to the Adams Express Company of 23 G. M. C. electrics for Detroit service and the installation of a fleet of heavya big interest on the transportation investment.

Philadelphia. The time is rapidly coming when not only big transportation companies, but merchants and manufacturers with haulage problems will appreciate the importance of standardized truck equipment and select vehicles for different classes of service from a comprehensive line that can supply any size or type of truck that individual needs demand. "The problem of the manufacturer today is big pro-

duction and big service. The manufacturer must not only be in a position to guarantee real service, but he must place himself in a position to fill in a gap at any time in case of accident or other emergency which may cripole a merchant's hanlage or delivery.

duty G. M. C. gasoline trucks by the same company in

"Transportation problems cannot be solved off hand

by a mere statement that gasoline trucks are better here, or that electrics will be more advantageous there. A careful study of conditions is necessary. considering all aneles of the service. Loads, routing. character of work. facilities for loading and unloading and a score of points -each has an important bearing on the return that can be secured from a



given truck invest- w. L. Day, General Manager, General Motors Truck Company.

probable that new types of vehicles will have to be developed to meet special needs.

"A large part of the responsibility for proper truck application rests with the maker. It is he who must educate, advise and work with merchants and manufacturers to the end that the greatest efficiency and satisfaction is secured. Every business man contemplating his transportation should realize that motor trucks should be intelligently driven and intelligently cared for. There is no economy in cheap drivers or inattention to trucks. First get the right trucks built by the right company; put the right man in the driver's seat and give the right attention, and it will pay

The town of Swampscott, Mass., has taken delivery of a Baker ambulance that was designed to meet the requirements of the town's committee, and which is maintained to be an ideal equipment of the kind. The town has provided a garage for the vehicle that is equipped with a rectifier and charging panel, and the care will be given the battery and machine by the town. The ambulance is in the service of the police department.

The Connecticut Company, a subsidiary company of the New York, New Haven & Hartford Railroad Company, which operates a system of trolley lines in southwestern Connecticut, has been using an electric truck in its service at New Haven with such success that it is extremely probable a number of similar machines will replace the horses now in use within a short time. For emergency work the truck has given great satisfaction.

INJUDICIOUS TRUCK SELLING METHODS.*

THERE are today, as nearly as can be determined, about 275 makers of commercial vehicles, while three or four years ago it would have been difficult to count 73. It is true that the demand is increasing, but it also is true that production is keeping up with the demand. We find that sales in Chicago, for instance, as shown officially by the local wheel tax registration, are increasing at the rate of about 100 per cent. a year, and it is believed that this condition is being duplicated in New York and other large cities of all the northern states.

The necessity for disposing of product in order to realize on it and devote the money to the payment of accounts, and the continuance of manufacture, is the root of numerous evils in the selling end of the business. There are two principal kinds—one originating with the factory and the other with the sales force. The executives at the factory probably believe that theirs is the best truck built, of its rated capacity and price, and they cannot see why the salesmen should have any great difficulty in selling it; consequently, they press the sales force.

The prospective purchaser professes doubt about the capacity, durability and economy of the truck, and as it is new in the market, there are no records of its long and satisfactory service with large and well known business concerns to which the salesman can point as convincing examples; hence factories feel that they must stand sponsors for, and in some way give proof of their confidence in their product. This may be under some maintenance or service plan by which the company undertakes to keep the truck in running condition for a year or a period of years for a certain contract price, or even to store and take care of and furnish drivers for the truck for a certain price a day or month.

The first result of such factory policies is to realize their object-quick sales. If there were no other and adverse results, they would become common practise, but the fact is that they are going out of favor both with the manufacturer and the public. Assume that the company places a considerable number of its trucks on the same terms, and that the cost of taking care of them becomes so burdensome financially that the company is unable to meet its obligations and goes into the hands of a receiver to be reorganized in order to step out from under the weight of its maintenance contracts. Where, then, is the advantage of the guarantee? Clearly, it would have been better to have purchased a truck with a 90-day guarantee from a company doing business in a safe, business like way, that is in itself an assurance that it will remain in a solvent state and be able to supply parts for replacement so long as the truck continues in service. The ability to obtain duplicate parts and send a truck to the service station of a manufacturer or agent for repairs or overhanding is a very important one to the user, particularly if he does not maintain a fairly well equipped repair shop in his own garage, which is possible only in cases where a flect of trucks is being operated.

The selling of trucks is not very different from the selling of other machinery and it should be done on the same sound basis. That there is such a thing asselling service on a safe and profitable basis is shown by the fact that some of our reliable factories, through their selling organizations, rent trucks by the month or year at a price which makes a profit for them on this branch of the business. Such a plan has its advantage, in that it enables the company to avoid free demonstrations, yet allows it to prove the capabilities of the truck and the price at which it can be operated, thus inducing sales.

The salesmen's difficulties are by no means imaginary. They are real and serious. In the larger cities where competition is keenest, it is not uncommon for a member of the sales force, when he calls on a prospective purchaser, to find about 10 salesmen from other truck concerns already there. The buyer holds all of the cards, and he uses one man's proposition of a discount from list price, another's to accept time payments, another's to give free demonstrations, another's giving service guarantees, etc., as a club to gain the same or greater concessions from the other salesmen. It calls for experienced salesmen to deal with such a case. It is not beyond the range of possibility that in order to gain some desired point from a company with which he wishes to deal that the buyer may lead the salesman to believe that his competitors have made greater concessions than in reality they have.

It is this situation that gives rise to the present evils of price cutting, long time payments, free demonstrations and guarantees. Of these the price cutting evil is the most serious and far reaching in its effect. In one case where an agent had worked up a prospect to a point where he thought he could close a sale at a certain amount below the list price of the truck, he secured authority from the factory to close at this lower figure, charging the difference to advertising. The deal was made on this basis.

The advertising feature derived from selling trucks to most buyers is very small unless the purchaser has great prestige in his particular line of trade. The result of this sale must be that if good material and workmanship were put into this truck, it must have been sold without a profit or even at a figure that means a loss when account is taken of all the selling and overhead expenses; hence the manufacturing company, or its selling agent, if it continues such a policy, is pretty sure to embarrass itself, or the inferior nature of the truck will be the cause of dissantisfaction

^{*}Digest of address delivered by M. L. Pulcher, general sales manager, Federal Moior Truck Company, at conference of N. A. A. M. in Detroil.

on the part of the buyer, and instead of an asset, the advertising he will give the truck will be of the familiar, non-desirable kind.

The demonstration problem, like most of the others, grows out of the developing conditions in the trade and the eagerness of manufacturers and their selling connections to get their new models into service in certain cities, and with large companies having national prominence. Purchasers of horses never ask for a week's demonstration of what a team can do in their service, because from past experience they know, Why is it not possible for a salesman or a maker of motor trucks that is well established in any of the larger cities to dodge the demonstration question, and point to the service the trucks are giving daily under the very eye of the prospective purchaser, who is at liberty to make inquiry himself of the users? But the salesman for a new make of truck finds he must satisfy the buyer of the truck as to the load capacity. speed, hill climbing power and general reliability of his machine.

Reasonable demonstrations in such cases are not objectionable, although they are of no value to the purchaser in determining either the east of maintenance or the stability of the truck. The trouble is that the demonstration is subject to abuse from both sides. Not long ago a large express company sent announcements to many truck manufacturers that it was in the market for the purchase of 200 trucks and requested that each maker place one truck in its service for a year's demonstration without charge, at the end of which time the order would be given to the maker whose truck made the best showing. Had this proposal been accepted the truck industry would have shouldered the expense of doing a large volume of the express company's work without compensation.

One of the principal faults indulged in by dealers and salesmen is the making of all sorts of elaims, promises and even guarantees that are not authorized by the factory. This is lad salesmanship and of a kind that causes much trouble, and must be overcome by the manufacturers. A common fault that has not been tonched upon and which is open to very severe criticism, is the fact that in order to make sales themselves, salesmen knock the other fellow's truck. The effect of this kind of salesmanship creates suspicion on the part of the purchaser and delays, if not altogether prevents, the sales of trucks.

TRANSPORTATION DELAYS AT CITY TERMINALS.

OF THE 287 motor trucks and horse wagons checked at railway and steamboat terminals in the cities of New York, Chicago and Detroit, it was discovered that these vehicles had an average delay of 11.3 minutes from the time they reached the proximity of the freight terminals until they arrived at the unleading platform and were ready to begin unloading or loading operations. Figures taken of the length of time required for these 287 vehicles to unload or load showed an average of 27.3 minutes. So that roughly speaking each vehicle waited almost half as long to get to the platform as it required to perform the loading or unloading. This loss of time cuts down the efficiency of motor trucks as well as horse vehicles.

The operator of the horse vehicle does not object seriously to this delay, because the horse must be rested and this offers a good opportunity. On the other hand, with the motor truck it is different, in that the truck does not need a rest, and every delay reduces the amount of work it can do in a day.

The investigations in all three cities showed that at certain periods of the day it is possible to so conduct traffic that little delay is caused. Between the hours of 7 and 8 in the morning 75 per cent. of the vehicles do not meet with delay, whereas at later periods in the day the maximum loss of time in Chicago ranges from 30 to 79 minutes, and in New York from 43 to 130. With vehicles held up for over two hours waiting to unload and being able to unload in less than 30 minutes, it is impossible to get that efficiency which modern transportation demands.

*Extract from paper read by David Bescroft of Chicago at N. A. A. M. conference in Detroit.

But all of the loss of time at freight terminals, whether in connection with railroads or steamboat docks, is not due to lack of capacity. Lack of system is a big factor in many cases. Ouite frequently at railroad terminals there is not a sufficiently large executive force to issue the bills of lading as called for by the teamsters. Often 25 to 40 teamsters are seen lined up waiting for such documents and some of them have had to wait more than an hour for them. In the meantime their wagon or motor truck is standing idle in the freight yard, not only losing money for its owner, but aiding in a general congestion of the place and so holding up the entire system. If a modern bank were as poorly equipped with clerical force as some of the railroad depots, it would be impossible for it to transact its business, even if the hours were extended from sunrise to sunset.

To demonstrate that it is possible to hasten the unloading and loading time at terminal depots, it is but necessary to look at the special facilities for hardling perishable goods. The employment of system will greatly ameliorate the present difficulties. To show how firmly the railroad companies are convinced of this we quote form a leading Chieago freight superintendent, who states: "If motor trucks were used exclusively at six of the big terminals in Chieago the work could be done in one-half the time and at one-third the cost. This would mean a saving in Chieago transportation at these six depots of \$4.32,000 a year."

The whole horse vehicle driver situation is so unsatisfactory that the dealer in motor trucks will have to give it most careful investigation or be will meet with disappointment.

THE BAKER FOUR-TON ELECTRIC TRUCK.

T 11E Baker Motor Vehicle Company, Cleveland, O., is now building an electric truck that has a capacity of four tons, and a tractor that is made in three sizes to haul loads in trailers ranging from two to eight tons. Machines of this type had not been previously made and the majority of the Baker wagons have been of two tons or less. To meet a demand for large vehicles that is constantly increasing the Baker company has produced these two types. One of the most recent deliveries of four-ton tracks was to the office of the public printer at Washington, D. C. and another has been placed in the service of the Pitts-burg Plate Glass Company. The company is also filling several orders for these machines.

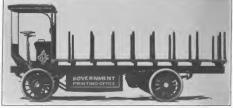
In general design the four-ton truck does not differ materially from the smaller Baker productions, although it is larger proportioned throughout. It has all the features of the construction and control and is built with a view of long endurance. It is claimed that spring leaves are retained in alignment by clips. The spring eyes are fitted with phosphor bronze bushings and are shackled with hardened and ground botts, and all moving spring parts are provided with compression grease cups.

The front axle is an 1 section dron forging of alloy

The front asle is an 1 section drop forging of alloy steel, heat treated, and the rear asle is the same material, rectangular in form. The spring seats are formed integral. The asle spindles are large and are fitted with Timken roller bearings. The jackshaft is of the well known Baker type and the steel housing that carries the assembly is mounted in the chassis frame by a single bolt at either end that holds the fitting on the housing securely between the ears of a bracket riveted to the frame. By the removal of the bolts the jackshaft may be lowered when necessary, and the support compensates any distortion of the frame from road shock. This form of jackshaft suspension is patented. The jackshaft is mounted in four

imported annular ball bearings and its operation is with the minimum of friction.

The motor is a General Electric machine, a four-pole type, series wound, and it has a capacity of 300 per cent. overload without damage. The armature shaft is mounted in anular ball bearings and the commutator is unusually large. It is claimed that the construction is such that the motor will require practically no attention during its life, It is enclosed in a steel shell and is thoroughly protected against



The Baker New Pour-Ton Truck, a Vehicle That Has Several Unusual Pentures of Draign.

it is comparatively light when the load to be carried is considered, and a feature that is entirely new in the electric truck as a type is the use of aluminum chain cases to protect the chains transmitting the power from the jackschaft to the rear wheels. The chains are run in a bath of oil and it is maintained that it is not necessary to remove the cases more than once a year and that they require but little attention after the installation of the cases.

One of the purposes of the engineers has been to cluminate dead weight without sacrificing strength, and this has resulted in the choice of materials especially adapted for the purposes and with particular reference to the work required of a component. It is maintained that the truck is built oversize throughout with the desired factor of safety in mind and that its carrying capacity is largely in excess of the rating. The frame is built with six cross members and these are hot rivected to the side members, substantial gussets and braces further strengthening it. This does not include the member that carries the motor. The springs are large and are 3.5 inches width, and all the dust and water. The drive from the motor to the jackshaft is by a Renold silent chain that is enclosed in an aluminum case and is operated in a bath of lubricant. This case is easily removable from both jackshaft and motor case should this be desirable.

These trucks are fitted with two sets of brakes. both internal expanding, acting within steel drums bolted to the spokes of the traction wheels. Each is operated independently and equalizers insure that the degree of retardation for each wheel is always alike with each set. The brakes are adjustable. They are so installed and the radius rods are so designed that there are no braking or driving strains upon the springs. The radius rods are adjustable at the forward ends. The battery eradle (all Baker machines carry the battery below the frame) is constructed of heavy angles and is designed to carry many times the weight it would normally have to sustain. The cradle is given added rigidity by channel section steel braces from the forward end to the chassis frame side member. These cradles are so arranged that the removal or installation of the batteries is at the side.

Extreme care has been taken to insure lubrication. and wherever parts in contact are moving compression grease cups of large size have been provided. For all bearing surfaces the usual provisions have been made for oiling and greasing. All the chains are perfeetly protected from the accumulation of abrasive substances.

The wiring of the trucks is installed with extreme care that the cables and wire may be protected from strains, wear or acid, and that there will be no frictional contact. The insulation is extremely heavy and there should be no cause for deterioration of the system from exposure. The wiring is provided with solid copper terminals that are soldered to the wires, which construction assures the best of terminal contacts.

The truck is operated by a steering wheel located at the left side and through connections that are designed to have unusual strength and endurance. The forward axle knuckles are heavy and the tiebar and the drag link are carried forward of the axle, where

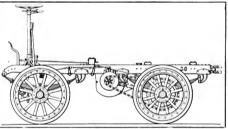
they are easily accessible,

The controller is a horizontal continuous torque drum type, the design of which is patented, and it is operated by a hand lever carried on the steering column, directly beneath the steering wheel and moving on a quadrant. This lever moves a sleeve on the steering post at the base of which is fixed a bevel gear, that meshes with a bevel pinion on the controller shaft. It is claimed for this design that it is advantageous in that an operator may have both hands on or very close to the steering wheel that this manner of control adds

the factor of public safety, especially in congested traffic. The controller drum is enclosed in an aluminum case and is fully protected from dust, water, hibricant and whatever might cause deterioration. There are five forward speeds and three in reverse, and a special safety device prevents the handle slipping accidentally into reverse. The changes of speed are made without arcing or fusing and are gradual, so there is no waste of current and no strain upon the truck.

The Baker tractor design is not greatly at variance with that of the truck that has been described, but the frame is materially shorter, and the battery is carried on the chassis instead of being suspended from it as in the other Baker machines. Being used for haulage of trailers and with the carrying capacity of small consequence the loading space is practically given over to the battery. The distribution of the load is with reference to obtaining traction. The machine is built proportionately for the work that it is to do. Endurance is the main purpose, as the tractors are intended for service of contractors and in construction work, or where the transportation is especially heavy. The expectation is that in hauling trailers from excavations and on steep, short grades the requirements will be very much in excess of the normal work. The chassis frame is short and the jackshaft is almost midway between the wheels, so that with the absence of long overhangs the machine appears diminutive when its use is understood. But the proportions of the mechanism and the parts indicate strength and endurance. The frame is built to withstand the strains of hauling by cable or chain or coupling and is rigidly braced and reinforced.

In the power equipment the size of the motor varies with the capacity of the tractor and the sprocket reduction of the motor speed is such as to give the most effective application of energy and keep the wheel sprockets as far from the surface of the ground as is possible. In every other respect than has been specified the tractor follows the general construction of the



while driving the truck, and side Elevation of the Baker Tractor, Which is Built in Capacities Ranging from Two to

four-ton truck. It is maintained by the maker that it may be assumed because the rating of the electric motor is different than any prime mover, and that it will yield its capacity at varying speeds, that the power is small, but it has been amply proven in tests much more severe than the tractors will ever be required to endure that they will haul loads and do any work that is possible for machines of this type.

Of 14 electric vehicles recently assembled before the factory of the Woods Motor Vehicle Company, Chicago, Ill., 11 represented the productions of different years, beginning with 1896, and then beginning with 1900 included one for each year.

The Anderson Electric Car Company, Detroit, claims to have the largest factory in the world devoted exclusively to the production of electric vehicles, there being no less than 12 acres under cover. This concern produces both pleasure and service machines.

BAKER 500-POUND DELIVERY WAGON.

Company Now Producing Vehicle of Light Capacity Intended for Fast Service.

The Baker Motor Vehicle Company, Cleveland, O., is now producing a delivery wagon of 500 pounds capacity that is intended for fast service, having a maximum speed of 20 miles an hour and a battery capacity of from 06 to 100 miles to a charge. The motor is a smaller type of those used in the larger Baker machines and the drive is by shaft and bevel gear to a semi-floating rear axle. The wheels are fitted with pneumatic tires. The body designs are open and closed. The open body has a loading space 30 inches square, and the enclosed body, with rear doors, has a space of 32 inches length and 36 inches width, measured at the seat level.

In appearance the machine is not unlike standard gasoline vehicles. With the enclosed bodies a hood is provided to protect the driver, which is equipped with



The Baker 500-Pound Shuft-Driven Delivery Wagon.

a windshield and side curtains. When built for central station work a series of trays and drawers is made in duplicate and the extra set may be packed and ready for loading, so that there shall be no delay for packing when the vehicle has finished a delivery. The wagons are equipped as are the other better known Baker productions.

MAKES RECORD DAILY MILEAGE.

General Vehicle Machine in Service in Hartford, Conn., Averages 59.33 Miles a Day.

What is regarded as a record for an electric delivery wagon of 750 pounds capacity was made recently by a General Vehicle machine in the service of Wise, Smith & Co., Hartford, Conn. The vehicle is equipped with an Edison battery. It is operated under the system of battery service imagurated by the Hartford Electric Light Company, the wagon being sold without a battery. A regular service charge is paid and the owner has the use of a battery as often as one is needed, an exchange being made at the central station. For the service a charge is made on a mileage basis, the price a mile covering the current and the investment of the company and the care and maintenance necessary in normal use.

This machine is used in regular work and in a single week it was run 356 miles, or an average of 59.33 daily, it being estimated that it took the place of six lorses, covering two regular routes and a special delivery. The Hartford Electric Light Company, which was the first public service corporation to adopt the policy of selling battery service, is now providing batteries for about 20 vehicles and it expects to increase this number materially. The estimated cost of operating a 750-pound wagon for 1600 miles a month with the service is \$84262, approximately 2.06 cents a mile.

Wise, Smith & Co., has this wagon and a 2000pound machine in service, and has ordered two more of 1000 pounds capacity, which will make its delivery service four in all as soon as the vehicles are delivered.

PHILADELPHIA BATTERY EXHIBIT.

Special Attention Called to Construction of Grids and Increased Productiveness Made Possible.

At the recent New York electrical exhibition one of the interesting displays was made by the Philadelphia Storage Battery Company, Philadelphia, Penn, the builder of the well known "diantond grid" Philadelphia tip plate batteries. The "diamond grid" frame for the Philadelphia plates has remarkable strength and this construction affords unusual longevity, it is elaimed, and it makes possible a lighter battery as well as decidedly increasing the capacity.

The company in all its exhibits demonstrates the construction of the grids and the increased productiveness as well as the decreased weight, by a series of sectional cells. Examination of the cells is invited and the qualities elaimed for them can be established by repeated trials.

Besides this the company also displayed a series of batteries made for different types of vehicles of different makers, and the products designed for varying purposes.

A large electric vehiele garage is to be built the coming spring for C. Schmidt & Sons, brewer, 12F. Edwards street, Philadelphia, Penn. This concern has now 19 machines in service and will, when the garage is built, have only electric wagons for delivery.

There will be no exhibition of electric vehicles at the New York pleasure automobile shows in January; it being the belief of the companies that have heretofore shown at these displays that it is not judicious to make exhibit where their products would necessarily be a small proportion of the total, and where they would not receive the desired attention unless departmentalized.

ELECTRIC VEHICLE PRACTISE.

Origin of Track Haulage Machines Driven by Primary and Storage Batteries and a Supplied Current---Experiments That Developed Practical Road Wagons and Mechanical Features of the Early Constructions.

By William W. Scott.

THE electric vehicle adapted for service requirements was first created in 1836 by Davenport, a resident of Brandon, Vt., who built a model locomotive that was operative on a miniature track. This was exhibited in London in 1838. In 1837 an Englishman samed Sturgeon claimed that he had conceived the means for driving vehicles and boats by electromagnetism. Similar claims were made by an Italian named Betto about the same time. In 1839 Robert Davidson of Aberdeen, Scotland, construced a machine that would move two persons along a rough floor. The first railroad locomotive was built by Davidson and was tried in September, 1842, on a track between Edinburgh and Glasgow. The machine

weighed five tons and moved approximately four miles an hour.

This creation was deeidedly interesting mechanically, as the motors were suspended on the axles, the armatures being eylinders of wood into the surfaces of which were inserted two series, each of three longitudinal iron bars spaced 120 degrees apart. The magnet cores were built, the limbs hol-Low, and the windings were of wire with insulation of cloth, A commutator was fixed on the axle to direct the current into the magnet coils. The 59 elements, each made of a

plate of amalgamated zinc between two plates of iron, 12 by 15 inches dimensions.

In 1840 Uriah Clark built at Leicester, England, a battery weighting 60 pounds that was credited with driving a car on a track for 2.5 hours. Latter the battery was increased in size and the machine drew several cars.

George Little, at Bristol, England, in 1844, built a peculiar motor that consisted of six radiating arms secured to the axle of one pair of wheels. On each of the arms was a bar parallel to the axle of the wheels that was magnetized. The current was supplied to the two magnets alternately and was cut off as the rotating magnetic same opposite to them.

In 1847 Prof. Moses G. Farmer constructed and eshibited in this country a magnetic locomotive, equipped with a battery of 48 Grove cells, that pulled a car with two passengers on a track 15 inches wide. At Baltimore in 1850 a man uancel Page built an efectro-magnetic locomotive that hauled a car and 12 passengers at a speed of 19 miles an hour on the tracks of the Washington & Baltimore railroad. At Boston in 1857 an inventor named Hall exhibited the model of an electric locomotive that was driven by power supplied from a battery through the rails. This was the first application of the central power station idea in the world.

There were no developments of value from these

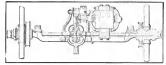
constructions, however. It was in 1871 that Gramme discovered the reversibility of the dynamo electric generator-that it could be used for converting electrical energy into mechanical energy. Not until 1880 did Faure, a French electrical engineer, perfect the lead storage battery invented by Plante by coating the plates with lead oxide. Faure's invention was regarded as having commercial possibilities and a company was formed that used the Faure battery to supply the energy to drive ears on tracks with dynamo-



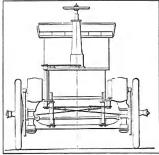
battery was composed of Patin Dog Cart, an Early French Machine of Distinctive De- electric motors.

Prois. Ayrton and Perry experimented with an electric tricycle in
England in 1882, using a regular manual power machine from which the pedals were removed, one rear wheel being connected with spurgearing. The motor was suspended under the seat platform, fixed above the axle, and a pinion on the motor spindle was meshed with the spur wheel. A platform suspended from the axle and from the backbone of the machine carried the battery of Faure or Sillon-Volckmar cells. The motor weighed about 45 pounds and the battery about 100 pounds. The machine was not a commercial success.

In 1884 Andrew L. Riker made his first tricycle in this country, and in 1886 Radeliffe Ward built a cab that was tried at Brighton, England. This cab had a battery of 28 cells slung on a tray carried below the body of the vehicle, the motor was mounted under



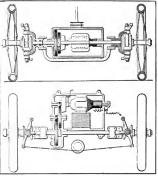
The Patla Driving Genr. Which Afforded Two Butlos of Speed the driver's seat, and on the motor shaft were two friction pulleys, one half the size of the other, which were geared to two loose pulleys on an intermediate shaft. This intermediate shaft in turn drove the road wheels by a belt. Either of the two loose pulleys could be connected with a clutch. The weight of the vehicle was 2000 pounds and it had a speed of from seven to eight miles an hour. An electric omnibus, probably built by this firm, was used in London in 1888 and was driven more than 5000 miles. It had a speed of about seven miles an hour. This year the Kimball trievele was built and used in America. Magnus Volk of the Brighton, England, Electric Railway, built in 1887 an electric dog cart that had as a source of energy a battery of 16 small cells located under the driver's seat. The motor was carried on hangers under the body and it drove one of the rear wheels by chain gearing and a countershaft. It was a small motor, rated at five horsepower, and the machine had a speed of nine miles an hour on asphalt and four miles an hour on macadam roads. Volk became associated with Immisch & Co., of London. He is credited with



The Krieger Conpe, Driven by Motors Fixed to the Front Wheel Pivots.

building the electric dog cart for the Sultan of Turkey, which was driven by a battery of 24 cells weighing 700 pounds and could be driven for five hours at a speed of 10 miles. The weight was about 1250 pounds. The machine was driven by chains to the rear wheels.

The electric runabout built for Fiske Warren of Boston by the Holtzer-Cabot Company in 1891 was the best production to that time and was decidedly an advance in design and construction. Pouchain, a French engineer, built a six-passenger phaeton in 1893, contemporary with the eight-passenger brake built by the Holtzer-Cabot Company for Mr. Warren. This was fitted with a battery of 54 elements of three plates each, composed of one Fulmen positive and two Dujardin negative plates. The capacity was 70 amperehours. The motor, a Rechnieuski type, was shunt wound, with a capacity of about 3500 watts, and had a normal speed of 1650 revolutions a minute. It was geared to the rear axle through an intermediate shaft and chain gears. The speed was varied by grouping

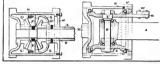


Cross Section and Plan View of the Jeantaub Driving

the battery cells and this was effected by rotating a cylinder which carried suitable contact pieces. The battery weighed 1100 pounds. The motor weighed 240 pounds and the vehicle 2500 pounds. This machine was contemporary with that built by W. H. Blood, Jr., at Kansas City, Mo.

Blumfeld and Garrard built in France in 1894 a vehicle that was developed from the bicycle in that it had small wheels fitted with pneumatic tires and it had a variable speed gear. The body was mounted on spiral springs on a tubular frame and the 28-inch wheels were equipped with four-inch tires. The motor was suspended from the centre of the frame with the shaft lengthways of the body. On the shaft was a friction wheel or roller that engaged with a disc on an intermediate spindle, which was geared by a chain to the differential gear on the rear axle. The motor was

driven at constant speed and to permit variations in the speed of the machine the shaft of the motor was made moveable lengthways, thus varying the radius



The Riker Hub Differential Gene and the Riker Pivoted Front

at which the friction wheel engaged with the disc and consequently the speed imparted to the disc. The battery was of 24 cells and was carried under the driver's seat and weighed 500 pounds. The current was estimated to be sufficient for 70 to 80 miles. The entire vehicle weighed about 1000 pounds, and during its trial made a speed of 10 miles an hour.

The possibilities of the electric storage battery were demonstrated to a limited extent in America by the use of the vehicles to which reference has been briefly made, and considering the construction of the batteries the machines were reasonably serviceable, The only batteries were of the Faure or Plante types and these were not only heavy, but were of decidedly small capacity, which was a condition to deter investigation and experiment, and to limit the development that might follow practical use. The demand for batteries was not large and this also militated against progression that would follow with more general use. In the experimentation with automobile vehicles it was found that the electrics were heavy, the capacity limited as to speed, mileage and number of passengers, and the places where the batteries could be charged were extremely few,

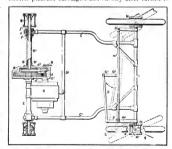
Despite these conditions attention was directed to electric wagons and carriages, and while there was no general assumption of industrial possibilities there were those who believed they might be utilized by those who preferred the silent running and easily maintained machines. There was a growing interest in the steam and gasoline engines as means of power for vehicles, and it may have been principle rather than possibility of business that impelled the few to continue the investigation of the electric. The Electric Storage Battery Company, Philadelphia, which was established in 1888, built batteries adapted for vehicles, and later on others engaged in this industry.

Of those who believed in the future of the electric carriage was Andrew L. Riker, whose work was largely carried on at Elizabethport, N. J., who was the head of the Riker Electric Vehicle Company, About the same time the Electric Vehicle Company was formed and established at Hartford, Conn. The American Bicycle Company gave some attention to the development of an electric carriage, and these were the three pioneers in manufacturing. The first Riker machine was marketed in 1897 and the same year the Electric Vehicle Company produced its initial carriage. The Columbia Company, Hartford, Conn., was the concern of the American Bieyele Company that tried the electric car, and in a short time the Indiana Bieyele Company, that built the Waverley bieyele, also began experiments with a carriage. This concern turned out its machine in 1898. The Baker Motor Vehicle Company at Cleveland tested a carriage for two years before it sold its first production in 1900. The same year the Babcock Electric Carriage Company marketed the first Babcock machine. There were numerous other companies that made exhaustive trials of machines.

Among the concerns well known at that time were the United States Automobile Company, Attleboro, Mass.; the General Electric Automobile Company, Philadelphia, Penn., and the American Electric Vehiele Company, New York, City, and all of these, together with the Electric Vehicle Company, have ceased to exist.

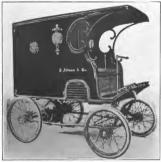
The Electric Vehicle Company was established by a group of Philadelphia capitalists to manufacture pleasure machines. Later on this company purchased the Columbia Company's rights, and still later the the Selden patent covering the use of a clutch between the engine and the traction wheels of an automobile vehicle, and turned largely to the production of gasoline cars and wagons. It went eventually into the hands of a receiver, was reorganized as the Columbia Motor Car Company, and later became a subsidiary company of the United States Motor Company. At one time this company had a capitalization that very closely approximated \$20,000,000.

The Riker Electric Vehicle Company and the Electric Vehicle Company began the manufacture of electric pleasure carriages, and shortly after turned to



The Flexible Frame Characteristic of All Riker Vehicles, the building of service wagons. The Electric Vehicle Company's original production was built with a tubular frame with fixed axles and was steered by individ-

ually pivoted front wheels. The motor was suspended from the frame supporting the body, this being a single motor with a long armature shaft containing a dif-



First Riker Delivery Wagen as Delivered to B. Altman & Co. ferential gear. At the ends of the shaft were pinious that meshed with external gears attached to the hubs of the front wheels. The controller afforded forward speeds of three, six and 12 miles an hour and two reverse speeds. The battery consisted of 44 chloride cells with a capacity of 75 amperes at a three-hour rate and was rated as having a mileage of 35 over ordinary roads. The machine weighed about 2000 pounds. The wheels were of the wire type. The first Columbia delivery wagon was with the axles braced to the body by jack bolts, no reaches being used, and the motor, rated at 40 amperes, was hung just forward of the rear axle. The motor was protected by a cast iron housing that enclosed the differential gearing. The drive was by the pinions on the armature shaft meshing with external gears on the rear wheels. The battery of 44 cells was carried in a cradle or tray below the floor of the body, and gave a mileage of 25. The body was 48 by 72 by 42 inches and was designed to carry approximately 1000 pounds.

The Columbia machines were designed by Hiram Percy Maxim, who became connected with the Electric Vehicle Company after that concern absorbed the Columbia Company. The design stated was used for the light delivery wagons, but with the construction of heavier machines two motors were employed, these being geared to the rear wheels by spur gearing. After the consolidation the Electric Vehicle Company's machines were known as Columbias.

The Electric Vehicle Company built a large number of cabs and broughams, in which the axles were fixed and the forward wheels were driven by motors, the pinions of the armature shafts being meshed with internal spur gears attached to each wheel. The vehicles were steered by the rear wheels, the wheels being mounted on knuckles. It was found in practise that these could not be handled in the streets with the same ease as the machines steered by the from wheels. They could not be easily driven away from the early after heing placed close to it for passengers to alight, a condition that was keenly realized if a street were middly or icy. These machines were also built with disc wheels having wooden rims.

The Riker Electric Vehicle Company's pleasure carriages were built with the Riker flexible frame, the Riker hab differential and the Riker proved front hubs, to which reference has already been made. The purpose of the flexible frame was to preserve the relation of the axles and to eliminate the distortion stresses. This construction proved to be very practical. The Riker patents were acquired for England by MacKenzie & Son and a number of the machines were built by that concern and need abroad. The delivery wagons and trucks were built with the same design so far as the frame and front linbs were concerned, but these were driven by two motors, which were geared by some gearing to the rear wheels.

It is said that the gearing of the motors to the from wheels was the conception of a French designer, and so far as is known it was a construction first applied in France. The Bouquet, Garcin & Schivre carriages were driven by a single motor and a countershaft and chains and sprockets, and the Jenatzy machines, built by the Societe des Transports Automobil of France, was equipped with a shaft connected with the armature shaft by a universal joint, this shaft carrying two pinions meshing in gears keyed to the differential gear shaft that carried the driving sprockets.



Early Type of Columbia Delivery Wagon of 1999 Pounds Capacity.

The pinions were of different sizes and a clutch between them engaged either at will so that there were two vehicle speeds possible with the clutches, and two others with the battery in parallel and in series. The Krieger electric, another French machine, was noteworthy from the installa-



Delivery Wagon Built by General Electric Automobile Company.

tion of the two driving motors on the pivots of the forward axle, so that they were turned with the wheels, and were geared direct by spur gears. The motors were four-pole, two poles shunt wound and two series wound, and when the vehicle descended hills the motors served as generators to charge the battery. The Jeantand carriage, another French machine, employed a single motor with a countershaft and yearing driving a shaft carried in a dead rear axle in the ends of which were large vokes. On this shaft at either end was a beyel gear, which meshed with a bevel pinion mounted on the bases of the pivot pins, and these in turn engaged with other bevel gears fixed to sleeves secured to the hubs of the wheels. This construction gave a substitute for a differential and permitted the movement of the wheels for turning. The Patin vehicle, still another French device, had a complicated driving system with friction clurches by which speed variations were obtained.

The United States Automobile Company's pleasure earriage was built with an undershing battery. The motor was mounted on the centre line of the rear shaft. No differential was used, but one rear wheel was connected to the revolving motor field and the other to the revolving armature, this afforbing the necessary flexibility. The lattery was of 40 cells with a voltage of 80. The motor had a speed of 1000 revolutions a minute, and the vehicle had forward speeds of three, six and 12 miles, and reverse speeds of three and six miles. One battery charge gave a mileage of 30.

The General Electric Automobile Company's machines were driven by two motors suspended from the rear axle and from the vehicle body. On the armature shafts were pinious that engaged with annular gears fixed to the wheel spokes. The motors were of the four-pole type with the armanure carried in roller bearings and rated at 80 volts, with the field windings in two coils, and it could be operated in series or multiple. The speed was 800 revolutions a minute. The pleasure vehicles were steered by the usual kuncklejointed front ask, but with the delivery wagon the forward ask was turned as with the animal vehicle, by a hand wheel and a worm and segment. The battery was carried in a compartment under the body and on a spring suspended floor to prevent damage by road shocks.

The first Waverley vehicles were built largely on bicycle principles, with tubular frames and wire spoked wheels. The motor was of the multipolar type and was rigidly mounted on the running gear with the motor shaft geared directly to the two rear wheels. The differential gear was incorporated with the armature shaft. The delivery wagon was of the same construction with a battery rated at 125 amperes and of 44 cells. The radius was claimed to be 40 miles and the speed from eight to 12 miles an hour. These machines were fitted with wooden wheels and pneumatic tires. A lighter vehicle was fitted with a combination body, being convertible from a pleasure machine to one for light carrying.

The American Electric Vehicle Company's vehicles were fitted with motors having hollow armature shafts adapted to climinate a differential gear. These machines were claimed to have unusual mileage.

The first experimental vehicle of the Baker Motor Vehicle Company was built with the motor housing forming the rear axle with the wheels mounted on the armature shaft, with which was incorporated the differential gear. The machines that were first sold in the market, however, were driven by a reduction chain



one of the Float Belivery Wagons Built by Waverley Company, from the sprocket on the motor shaft to the sprocket included with the differential assembly in the live rear sylo

(To Be Continued.)

UTILITIES OF THE ELECTRIC VEHICLE.

Varying Services for Which These Machines Are Especially Adapted and in Which They Have Been Worked with Decided Success, Both for Long and Short Hauls.

THOSE who believe that the service for which electric vehicles may be utilized is limited should take the time to make observation and learn first hand that there is hardly a class of usage that might be conjectured in which these machines have not been well tried, and that there is not even a more general knowledge of the possibilities is due largely to the refusal of the public as a whole to seek information of a subject that is so vitally innortant.

There are those who will maintain that it is essention have vehicles of large radius of movement, because it is very generally accepted that the long haul is the most profitable, although it may not be very generally known that the greater part of haulage is comparatively short distances. In discussing this subject livery with the latter one sacrifices time and pays less. But it is obvious enough that all do not send commodities by express. The cost is probable that tons for every pound sent by express it is probable that tons are shipped by freight. Not only this, business arrangements are made with an understanding of conditions and these are accepted for obvious reasons. In applying this to motor vehicles it may be necessary to explain that great speed and very rapid haulage is not ordinarily required or expected. Special delivery costs money, no matter in what form, and it is seldom indeed that there would be necessity of extreme mileage capacity, which some affect to believe. Assume for a moment that a vehicle of five tons capacity has a speed of 12 miles an hour, and this would mean a possible



Some of the Fleet of Six Electric Wagons in the Service of the Lincoln Sufe Deposit Company, New York City,

it may be well to emphasize that no arbitrary point can be fixed where profit ceases and loss is experienced in any haulage proposition, simply because each instance differs, and it is no practical to determine that any given mileage is the limitation. By this is meant that it is impossible to apply a rule, and each case must be worked out with reference to innumerable factors.

It is reasonably certain, however, that several elements must be regarded in transportation problems, and the most important of these is whether or not economy of time or economy of expense is the object sought. In the one case, where time is a factor, it may be profitable to carry a load a long distance by the fastest form of vehicle, while if cost alone were the main consideration the shipment could possibly be made by a much slower and less expensive transport, as by freight, for instance. This may be the better understood if one compares the express and freight services of the country, with which all are reasonably familiar. With the fermer one parts for speed and demileage of 120 if operated continuously at maximum speed for 10 hours a day. It is extremely improbable that this machine would be driven at an average of more than 40 miles daily, which is but a third of that which it could accomplish. The actual running time is three hours and 20 minutes at top speed, or five hours at two-thirds speed, or possibly eight hours at five miles an hour. But as 40 miles is probably an outside figure, it will be found by close observation that maximum speed is seldom realized when baded, and that equally good progress could be made with a machine with a smaller power plant and the consequent economy, and a lesser radius of movement. This applies to average work and not to specific cases where an extreme mileage might be desirable.

Taking the electric vehicle of today it will be found that the battery capacity of the lighter types will range from 45 to 54 miles, manufacturer's ratings, and that the five-tion trucks are rated at 35 miles. As all electric mileages are based on carrying a load half the dis-



Electric Ambaiance of the Moant Sinal Hospital, New York City, in Service Since 1902—Photo Copyrighted by the New York Edison Company, 1912.

tance, with a reasonable margin in excess of the limit, a moment's reflection will convince one that at 12 miles an hour for the smaller machines and seven for the larger, the actual running time provided for at maximum speed is from four to five hours. But it is also apparent that it would be impossible to drive at this rate through streets and traffic, and that practically, at least, the running time is extended another hour in actual work.

What applies to the electric can be applied to any other form of machine, and it may be said that in starting and stopping in congested streets the electric has the quality of exceptionally easy control and comparatively quick movement. That is to say that it ought to be faster in crowded highways than other vehicles.

In work in the cities the electric wagon or truck then has sufficient speed and mileage capacity, can carry a load up to its rated limit, and where the work is within its radius it can be depended upon for practical and consistent service. The probabilities are that the average haul in most cities, without excepting New York or Chicago, is not more than three miles, but of course there is work where it is necessary to traverse routes that may reach 35. Everything depends upon the requirements. There will be extremes in all cases and yet the average may be relatively small. When the service of trucks is under consideration it must be remembered that with animals from 12 to 20 miles daily was looked upon as limitations, half of the distance without load, and the vehicle capacities are not as a rule as large with horses as with power wagons. With 20 miles as the maximum it will be understood that the average was decidedly less, and this being so it is difficult to understand why it is that extreme mileage capacity is to be sought when it cannot be utilized but a very small part of the time the vehicle is in service. Not only this, but it is also a fact that demands for haulage have not been for increased mileage only. There is, assumedly, the same volume of haulage for the shorter distance that always existed. In fact the probabilities are that there are even more short hauls.

The utilization of the electric vehicle in all forms of hanlage is surprising to those who are well informed. The uses found for machines of this types are indeed numerons, and it may be said that each day they are found to be practical in work for which it is generally believed that they are not especially adapted. Of course there is the possibility of doubling the mileage by changing the batteries, and it is practical to work them almost constantly by shifting the crews and the source of current supply. Probably one of the hest illustrations of what may be done is afforded by a large brewer of New York, whose machines are frequently driven from 70 to 80 miles daily when business requires, and with spare batteries he is ready for any exigency that may arise.

The same service is secured by a man who operates a parcel delivery business in Hartford, Conn., who has been able to work his electric wagon for practically double the number of hours when demands necessitated. He maintains that he is in business to make money and he finds that it is economical to make the change of batteries and have what is practically as much to him as two vehicles. He is so situated that he can extend his work over a somewhat longer pe



The Laiest Electric Ambul ance is New York, the Property of the Bockefeller Institute-Photo Copyrighted by the New York Edison Company, 1912.



Raising a 40-Ton Light Poir with the Power Winch Installed on a Five-Ton Electric Truck—An Example of Construction Wark—Photo Copyrighted by the New York Edison Company, 1912.

riod of hours than might be possible with others, and he has adapted his methods to the capacity of his vehicle.

Taking the electric machine from every point of view it may be said that it is utilized in all forms of transportation and in innumerable work. It has been found to be especially adapted for delivery work because it is so economical and it requires so little attention. One of the conditions that has deterred business men from more generally using them has been the lack of garages where specialized attention could be given. but this has been met in numerous instances by the manufacturers establishing branches where electric garaging facilities can be obtained at reasonable cost. and agents have in numerous instances opened stations in connection with their agencies for the benefit of their customers and others generally. There are, in some of the larger cities, exclusive electric garages. and there are some stations which give attention to

There are very few of the last mentioned class up to the present time, but it is extremely probable that the number will be multiplied very rapidly.

industrial vehicles only.

It may be pointed out that where delivery systems are of large proportions the electric wagon and truck often forms a considerable part of the cquipment, and this is especially true of the large cities, as in New York, Chicago, and similar commercial centres, and these are operated generally from garages that have been constructed and equipped with the best of facilities for maintenance and care. Probably no better examples could be pointed out than B. Altman & Co., R. H. Macy & Co., Arnold, Constable & Co., Gimbel Brothers, John Wanamaker, Carson Pirie Scott & Co., and tirms of similar character in New York, Philadelphia and Chicago, which have requirements necessarily exacting and entailing services that must be absolutely reliable.

It is also a fact that these urms have increased their installations after a sufficient experience to demonstrate the practicability of electrics, and

have established the electric divisions as sufficiently economical and dependable to justify a continuance. Obviously, as knowledge of these machines has increased the better results have been obtained, and as these services are operated by carefully developed systems the records show precisely what has been accomplished as well as indicating possibilities with perfected operation.

The requirements of the large express companies are also exacting. A large part of the business transacted is the haulage of packages of differing sizes, and generally delivery is made on routes with regular or special calls as the service may demand. Necessarily the installations must not be larger than are sufficient to colect and deliver the packages, and yet there must be a considerable degree of elasticity as there are times when the volume of haulage may be increased very largely. This variance compelled the maintenance of a reserve of animals and wagons when



Atlantic 3.5-Ton Truck, Londed with Metal, That is Utilised for Heavy Haulage.



Studebaker Wagon I and for the Transfer of Silver, Ruga, Fura

horses were used, and of course an expense that has been eliminated with the use of motor vehicles. Under any circumstances there is only need of additional men, for the machines may be used as much of the time as is necessary, and the experience with electrics has been that they have abundant mileage capacity for the average service without change of batteries. Of course where the needs are extreme, the batteries may be "boosted" and additional trips made, and as there are numerous stations in New York and perhaps other cities where supplementary charging is possible, it will be understood that the probabilities of delay from battery exhaustion are small.

Where the haulage is extreme and the speed desired is fast there are conditions where the gasoline vehicle would give the better service, but if the installations of the express companies are to be regarded as criterions these are the exception and not the average. Where the deliveries are to be made long distances from the central receiving point it is far more practical to have transfer made by vehicles of large capacity, and to establish distributing stations from which the faster and lighter wagons can be sent out. This system is used with a number of the department stores of New York and Chicago, and the result has been a material reduction of dead mileage and a decided expedition of the delivery of the concern.

From the experience with the transfer hanlage and distribution system there is much to commend it, and it would appear that this will eventually become the vocue with the majority of the large concerns, but it is impracticable to endeavor to adapt this to the small business, where the deliveries are frequently wide apart and in a large area. Where the volume of haulage is comparatively small and the service corresponds it is unite as essential to route the trips and economize the mileage as with the work of the express company or the mammoth department store. It may be said the success of business depends in no small measure upon the care taken to make deliveries with the least cost possible. Accommodation may at times justify additional expense, but promotion of custom is always to be advocated, and for either purpose the motor vehicle has undoubted capacity.

Where the light delivery wagon may be utilized to good advantage is in service where the loads carried are small, regular stops and variable deliveries are made, and large mileage is covered. Such work is performed with the fleet of Waverley 600 and 1000-pound. wagons operated from the New York City headquarters of the Fleischmann Company, which distributes yeast in the metropolis and its suburbs, and to customers whose places of business are routed earefully. It is essential with this work that the machines be driven so far as possible to a schedule and as the business transacted is constant there is but little need of reserve or elasticity of the service.

In direct contrast with the examples that have been stated is the work required of the Lincoln Safety Deposit Company, which maintains a fleet of six General Vehicle wagons and trucks in the haulage of property that is to be placed in its vaults for safe keeping or is delivered at the homes of the owners. Orders are received and the property handled as desired, but it will be apparent that the work is not only variable, but the calls are infrequent, this class of service entailing extreme care to obtain the greatest economy. Occasionally it is necessary to take property out of the city and runs of 35 miles or more have been made in a short time. For instance a load was taken to Stamford, Conn., and delivered, this distance being approximately 35 miles. The run was made in 4.5 hours and the truck remained over night, making the return the following day. There was no hesitancy in making the trip, although the load was taken the entire capacity mileage instead of half, the usual rating of the vehicle. It is evident that the transportation system of this company is more costly to maintain than were the work constant, but this would apply no matter what the conveyance used.

A similar class of variable work is required by the



laters-Passenger Omnibus. One of the Latest Productions of the General Motors Truck Company.



One of a Ficet of 29 Waverley Light Delivery Wagons Used by the Fielschmann Company, New York (11).

hospitals of New York, as the ambulances are dispatched wherever needed, and the calls may be frequent or occasional, but it is imperative that they always be in readiness. The oldest electric ambulance in New York is the property of the Mount Sinai Hospital. this being a General Vehicle machine that has been in use since 1902, and it still operating well, it making an average of 400 calls annually. The latest form of ambulance is the Detroit electric that was recently added to the service of the Rockefeller Institute, and which is required to make a large mileage. Both have been found extremely practical, being decidedly comfortable for the unfortunates transported in them, being easy to control when drived rapidly over all forms of highways and through heavy traffic, and having the endurance that is necessary to insure constant operation.

Still another class of work is that entailed with the business of the West End Storage & Warehouse Company, which has utilized motor vehicles since 1901, when it placed in service the first electric truck used in commercial work, this being a two-ton General Vehicle machine. The haulage is in every way variable and there is at times demand for work that could not well be accomplished without vehicles having a large reserve. Two years since this company replaced the original electric machine with a new wagon of the same make, and later on added a one-ton Studebaker wagon. that is

used principally for transporting goods that are placed in the vaults and are as a rule costly. Similar service is given the Columbia Storage warehouse by a Laus den vau and two gasoline machines of Walters

make, and the Manhattan Storage & Warchouse Company, although doing much of its work with animals, has installed a Studebaker electric van that is utilized for special work.

The Globe Storage & Cleaning Company employs two Lansden vans for the collection and distribution of carpets, it making a specialty of renovating carpets and rugs, and in Brooklyn the Eagle Storage & Warehouse Company has a General Vehicle electric wagon that is used for the transportation of rugs and silver, employing gasoline machines for hauling furniture. The Long Island Storage Warehouse Company in Brooklyn also has two electric wagons and two gasoline vehicles engaged in its haulage, and the Pioneer Warehouse uses a Lansden electric machine.

In construction work motor vehicles have been used with a very large measure of success, but to the best advantage where it is possible to facilitate loading and unloading. In many instances a large measure of satisfaction has been obtained by the equipment of the machines with special appliances for hoisting and the like, and in differing work it is possible to utilize these portable facilities with much economy. While animal apparatus could be used advantageously, slow transpartation and the need of adaptation to meet each individual requirement has been the occasion of considerable additional cost. An illustration of possibilities is given in which a 40-foot lighting pole is being erected in New York City, the iron column being hoisted into position by a power winch carried as regular equipment on the truck. Another example is shown in the use of an Atlantic 3.5-ton truck for the haulage of structural metal, this being a work in which the machine was economical and reliable.

In the transportation of passengers the wagon chassis have been equipped with bodies accommodating from 12 to 20, and these have been driven in regular and irregular service with very satisfactory results. The General Motors Truck Company, Electric Division, has recently produced a machine that is to be standardized as a type and will no doubt meet the requirements of those who desire commodious, serviceable and economical machines. This has a capacity of 16 passengers and it is suited for all manner of public service, being particularly adapted for city traffic.



Some of the Deteolt Light Delivery Electric Wagons in the Service of the Caesan, Piric, Scott Company, Chicago, Ill.

PRACTICAL ELECTRIC GARAGE SERVICE.

Successful Business Developed by Memphis Concern, Caring for Pleasure and Commercial Vehicles.

An example of the possibilities by practically stimulating electric vehicle use may be found in the experience of the Memphis, Tenn, Consolidated Gas & Electric Company, which conducts a garage in its own name and under its direction for the exclusive care and maintenance of electric machines. In that city until a year ago there was no station where owners of electrics could receive the attention that was demanded by those owning other automobiles. In Memphis were a number of electrics, mostly pleasure cars, desirable by women because of their cleanliness and noiselessness and ease of handling, but which were not well maintained as a rule because of lack of facilities.

The company opened a garage and announced its purpose to give good service, and established prices as follows: Full service, a month, \$25; full service less delivery, a month, \$20; vehicle care and oiling, a month, \$30; battery care, a month, \$20; wagons, 1000 to 3000 pounds, full service, a month, \$20; charging energy on above contracts, a kilowatt-hour, five cents; charging energy (no contract, \$1 minimum), a kilowatt-hour, 10 cents; dead storage, a month, \$75; wet storage, a month, \$12.20; single washing, day, \$1; single washing, night, 75 cents; battery and car labor, an hour, 75 cents; single call or delivery, 25 cents.

The original garage floor space was 6500 square feet and eight months after the station was opened it was necessary to increase it to 11,500 square feet. Now its customers include 11 service wagons, nine of which have been placed in service since the opening of the garage, and 34 pleasure cars, a total of 45. The station has 26 charging plugs and its average use of energy is more than 600 kilowatt-hours. The company has advertised the service and guarantees good work-mashio and attention.

Electric Truck in Electric Service—The electrical commissioners of South Norwalk, Conn., have given an order to the General Vehicle Company, Long Island City, N. Y., for a G. V. electric truck. The vehicle will be fitted with every device to make it applicable to the work intended, and electric lights will illuminate the interior during night hours. The truck can be charged at the electric light plant without any material cost to the town.

The dealers' announcement of the Waverley Company, Indianapolis, Ind., recently issned, is in the form of a booklet of 16 pages, 11 by 16 inches, handsomely illustrated with three and four color plates, in which every product of the company is represented. The service wagons range from the 1000-pound delivery machine to the five-ton truck. Aside from the pictorial attractions the booklet is of unusual interest from the forcible selling talk it reflects.

NEW GENERAL VEHICLE FACTORY.

Three Additional Structures Needed to Take Care of Increased Demand for Its Product.

The work preliminary to the erection of the new factory buildings of the General Vehicle Company at Long Island City, N. Y., is progressing rapidly, and it is expected that the construction will shortly be begun. The additions to the plant will include three buildings and the arrangement will be with these on three sides of a quadraugle. One of the structures, the principal building, will be 700 feet length and 250 feet width, and another will be seven stories in height. The foundations are built on concrete piling and on these the steel and concrete walls will be raised.

The equipment of the new factories will be the best that mechanical skill can produce and the machines will be driven by electricity, there being an individual motor planned for each machine. As the wagons and trucks are standardized the parts will be interchangeable and made of the highest grade materials. A considerable part of the plant will be given over to the building of the trucks under the Mercedes rights. The factory has been so pressed with the electric truck orders that a temporary building has been recreted for assembling, and this will be utilized until the permanent structures are ready for use.

ELECTRIC VEHICLE ASSOCIATION.

Interests in the Metropolis Inaugurate Activities Which Should Promote Use of Service Machines.

The New York Electric Vehicle Association has inaugurated activities that ongith to be extremely stimulative of the use of electric vehicles of all kinds in the metropolis and vicinity, especially with reference to service machines. The directors at the last meeting of that body elected Henry C. Fling secretary and Harvey Robinson treasurer, and arranged for the preparation of publicity matter by A. H. Miller, who is well known and qualified for this work. New York now has nearly 2000 electric machines in use and the association hopes to increase the number materially.

Committees were appointed which will direct the promotive endeavors of the association with reference to charging stations, the proposed co-operative garage, traffic and service runs, operating costs, publicity and membership, and it is proposed to have these works of a character that will be in every way beneficial.

One subject in which the association is especially concerned is the establishment of a system of charging posts or stations for the suburbs of New York, and it is expected that the association will shortly authorize the publication of a book of road maps and other information that will benefit the electric vehicle owners and users. NO 12

VOI. 111

DECEMBER, 1912. AUTOMOBILE JOURNAL PUBLISHING COMPANY Times Bldg., Pawtucket, R. I.

William H. Bluck, Treasacer. D. O. Binck, Jr., Secretary, Dublishers of

THE AUTOMOBILE JOURNAL THE ACCESSORY AND GARAGE JOURNAL 'Phone Pawtucket 1000.

EDITORIAL DEPARTMENT.

CARL A. PRENCH. C. P. SHATTUCK. WILLIAM W. SCOTT.

ADVERTISING DEPARTMENT New England-

John W. Queen, 6 Beacon Street, Boston, Mass. Central States-

W. R. Blodgett, 25 West 42nd Street New York City. Phone Bernnt 2776

Western States-

C. A. Eldredge, 304 Sun Building, Detroit, Mich. Phone Cherry 2240. P. G. Larian, 4707 Magnolla Ave., Chicago, Ili.

PUBLISHED THE FIRST OF EACH MONTH. SUBSCRIPTIONS.

The United States and Mexico, the year, \$1 in ndvance; Can-ada and Foreign Countries in Postal Union, the year, \$2 in advance. Fifteen cents the copy.

ADVENTURES BATES

Information given on request. All advertising copy must reach this office not laier than the 25th of the month preceding. Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal appara tus, the motor industry and the trade, will receive atten-Stamps must be enclosed to insure return of unsollcited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtuckst, R. L. under the Act of March 3rd, 1879.

REGARDING PARCELS POST.

By the provisions of the act of Congress approved Aug. 24, 1912, the Postmaster-General must prepare such special equipment-sacks, stamps, maps, etc.-as is necessary for the inauguration of a parcels post system before Jan. 1, 1913. The act carries with it an appropriation of \$750,000, with which all this equipment must be purchased and all provisions made for the delivery of this new mail matter.

That eventually the parcels post system will be placed upon a motor truck basis is probable. Virtually, the government will take over at least a portion of the business heretofore done by the various express companies, and it is to be presumed that the postoffice officials will profit by the experience of their predecessors in the administration of this business. The express companies have been adding mechanical transports to their equipment very rapidly during the past year.

But the federal government is not in a position to purchase the necessary motor trucks at this time. In the first place, \$750,000 would not go far toward equipping the entire country with such vehicles. In addition, the postoffice department has not yet formulated a plan and has no possible means of knowing the volume of business it will be called upon to handle.

Under the present arrangement with the express companies, parcels to be shipped by express are called for at the home of the sender, if desired. Parcels to be mailed under the international parcels post system. must be delivered at the postoffice by the sender. Which plan will be adopted by the government for the new domestic parcels post system?

Express companies decline to make delivery of parcels except within a certain radius from the receiving office. The postoffice department must extend the benefits of free delivery to the parcels post system. but it does not yet appear whether the regular city and rural carriers will be called upon to assume the added burden, or special carriers are to be appointed for this particular branch.

All these things must be worked out, and it is not improbable that teams and drivers will be hired, or that this delivery will be let out on contract under somewhat the same plan as is now followed by the socalled star routes. In either event the actual earrier would prove a prospective purchaser rather than the government.

There is no mistaking the fact that the parcels post system is to open a splendid field for the motor truck salesman, but that it is to interfere seriously with the business of the industry is hardly probable. The business man who has decided upon the purchase of an industrial transport may give his order without fear of its being held up pending the filling of any enormous contract with the United States government. In the meantime, the manufacturer would do well to cultivate this new field, because it will prove the means of developing a demand that will be far-reaching in its effect upon the industry.

THE MASSACHUSETTS SITUATION.

It will be remembered that a bill limiting the weight of motor trucks used on the public highways was introduced into the Massachusetts legislature at its last session. After some little discussion and several hearings the propositions was passed along to the legislature of 1913. Evidently there is no disposition on the part of its originators to permit it to be forgotten.

The same reasons which were advanced against its passage in 1912 have equal force at this time. It appears to be a question as to whether the various towns in the commonwealth shall put their bridges in proper condition to accommodate the modern form of transportation or the development of the industry shall be hampered by restrictions which cannot help but retard the purchase and use of mechanical conveyances.

The industry should see that the matter is placed in the proper light before the incoming legislature, as the decision rendered in Massachusetts is liable to have an important bearing upon future legislation in other states.



Manicipal Service Equipment



WHITE PROTECTIVE WAGON.

Details of the Latest Equipment Placed in Service by the Department in Boston.

The Boston Protective Department, which has charge of the protection of goods from water during fires in the metropolitan district of Boston, recently placed a White car, made by the White Company, Cleveland, O., in service after subjecting it to an exhaustive test, particularly with reference to its hill climbing ability.

The chassis is a regulation 1.5 ton White, the fourcylinder block motor having bore of 3.75 inches and stroke of 5.125. Intake, exhaust and water manifolds are cast integral, and the valves are all on one side. Coding is by water, a centrifugal pump being employed. The honeycomb radiator is so supported that it does not receive the strain to which the frame may be subjected on rough roads. Lubrication is by a combined forced feed and splash system which has proven very satisfactory in service. Ignition is by high-tension magneto.

The clutch is a leather faced cone member. The transmission is of the selective type, providing four speeds forward and reverse with direct drive on the third gear. Drive is by shaft to the rear axle, this being fitted with two universal and one telescopic joints.

Two sets of brakes are fitted, both acting on large drums of wide diameter on the rear wheels. That actuated by foot is external contracting, filter lined, and the hand operated members are internal expanding.

The frame is of heat treated crucible, chrome nickel steel. Springs are semi-elliptic front and rear. The front axle is a one-piece drop forging of 1 beam section, and the rear comprises three members-gearcase, right and left axle sleeves, supported by a heavy truss. All gears are accessible through a large cover on the housing, and are removable without splitting the gearcase. The wheelbase is 144 inches and the tread 56. Tires are 37 by five inches, all around, with dual members in the rear. Demonntable rims are employed.

As will be noted, the driver is placed at the left with centre control levers. The lamps are lighted by electricity and the White electric motor starter is another valuable feature, in view of the necessity for nuick action when the machine is called on an alarm.

Under the seats on either side in the rear are carried 28 large water proof evers, which the crew of four to six men spreads over house furnishings or merchandise in stores to protect them from water. In the box placed cross-wise just back of the driver's seat, the door of which has the mark '3 A" upon it, are stored door openers, crow bars, axes, shovels, brooms and a battering rain. Above that, in another compartment, are rospes, lams, etc. At the extreme rear are two



White 1.5-Ton Truck Recently Pinced in Service by the Boston Protective Department for Carrying Protective Covers for Use in Case of Fire.



Rear Yew of Boston's Protective Wagon on White Chandle. compartments, in the lower one of which, on a level with the bottom step, is the life net box, and in the one just above it, "squiligees" for pushing water off the floors. The normal load weight about 3200 pounds.

G. M. C. DOG CATCHER'S WAGON.

Novel Addition to the Motor Equipment of the Police Department in Detroit.

It is not at all surprising that the city of Detroit should utilize motor equipment, wherever possible, but it would seem that the officials in the heart of the industry turn to the manufacturers of automobiles for the solution of very nearly every problem which presents itself. It is possible that other municipalities

make use of a motor car in riding the city of unlicensed dogs, but it is safe to assume that none has a more pretentions schiele than the police department of Detroit, a photograph of which is reproduced herewith.

The ear is a G. M. C. gasuline wagon, made by the General Motors Truck Company, Pontiac, Mich, and is designed to take care of the dogs in the most humane manner. Fourteen cages of differing sizes are provided, making it possible to keep a particularly victous dog from the others when this becomes necessary. Each cage is removable and equipped with a water pan es-

pecially designed for the purpose. Since it was placed in service this G. M. C. has impounded an average of 90 muzzleless canines a day.

ADAMS FIRE APPARATUS.

Latest Type of Vehicle Produced for the Department in Kittanning, Penn,

An accompanying illustration presents the hose wagon recently completed by the Adams Brox. Company, Findlay, O., for the fire department in Kittaning, Penn. The body is mounted on the regulation L5-ton chassis made by this concern, and the vehicle is canable of a suced of 30 miles an hour.

The motor is a four-cylinder unit, with bore of 3875 inches and stroke of five, cast en bloc and with ample water circulation between each cylinder. The rated horsepower is 30. The inlet and exhaust valves are located on the right hand side of the motor, and are mechanically operated. Lubrication is by a combined force feed and splash system. Ignition is by high-tension magnetic.

The clutch is a multiple disc, and the transmission is of the selective type, affording three speeds forward and reverse. Two service brakes are fitted to the jackshaft, being operated by pedal, and two emergency members on the rear wheels are actuated by hand lever. The driver is located on the right with right hand control. Solid tires are employed, 36 by 3.5 inches in front and 36 by three, dual, in the rear. The wheelbase is 186 inches.

The fire equipment includes: Two extension ladders, two six-gallon Babeock hand extinguishers, two crow bars, two fire axes, two hand lanterns, wire basket, two electric and oil dash lamps and one tail lamp, 12-inch searchlight and Prest-0-Lite tank, 10-inch locomotive bell and locomotive exhaust whistle. The



G. M. C. Day Calchers' Wayon in Service with the Detroit Police Department

body is painted pure white with gold stripings, and all metal parts are brass finished.

MOTORS FOR GARBAGE COLLECTION.

New York Decides to Install Several After Experimenting for the Past Year.

While several European cities have obtained very satisfactory results in the utilization of motor vehicles in the collection of garbage, the officials of New York City were not convinced of the practicability of this plan until recently. It will be remembered that Street Commissioner William Edwards hired a number of trucks for this purpose about a year ago, and this experiment has been watched with considerable interest.

The experts agree that one of these motor trucks will do the work of six teams and that the saving in

DECIDED MAINTENANCE SAVING.

Experience in Victoria, B. C., Shows Splendid Economy Resulting from Motorized Fire Department.

June 2, 1911, two pieces of motor equipment were installed by the fire department of Victoria, B. C., and basing his estimates upon the experience gained with these Chief Thomas Davis believes that the department could be completely motorized at saving in annual expense of \$3415. He finds that the cost of maintaining a single horse is \$214.99 a year, as against \$22 for one automobile hose wagon.

The two motor vehicles have cost absolutely nothing for repairs, and the chief estimates that this item would be no more for one class of equipment than for the other. He considers that the automobiles have an



Vones 1.5-Ton Truck I hassis Fitted with Hose Wagon Body for Fire Department in Kittanning, Penn.

time thus accomplished will be over 65 per cent. As a result 35 machines are to be installed as soon as possible and it is estimated that 165 more will be required to take care of the city's needs. The first wagons are expected to meet the growing demand for better service in the outbring districts only.

The street commissioner has asked for an appropriation of \$210,000 for garbage collection wagons and \$200,000 for the purchase of motor street sweepers. The same plan has been followed with respect to the sweepers, and it would seem that the rented machines have demonstrated their value in this field as well.

This action on the part of the New York officials places that city in the lead among American municipalities along this line. It is understood that other communities are considering the purchase of similar vehicles and undoubtedly the experience here will have decided bearing upon the situation elsewhere. efficiency of at least 50 per cent, more than the horses, not to mention the fact that the former carries 1800 feet of hose as against 1100 feet for the latter. Granting that nine motor pieces would be required to replace the 18 horses now in service, the chief presents the following table of comparisons:

New horses (annual estimates)	
Horse feed % \$13 a month each	2 NIIA
Repairing and renewing barnesses, brushes, brooms.	
soup, etc.,,	400
Stall planks	75
Veterinary fees % \$20 a month	240
Shoelng	544
Total for horses	\$6063

BRIEF ITEMS FROM SEVERAL CITIES.

Truck for Road Construction—In order to complete the equipment which the board of public works in Louisville, Ky, needs to do the street work that has been planned, a five-ton motor truck will be bought in the near future. This vehicle is required for hauling broken rock and bricks to be used in construction work. The board already has a crusher and a mixer and with a motor truck to haul material the city expects to save the exorbitant prices charged by contractors.

Middleboro's New Fire Apparatus-A new combination fire truck, made by the Knox Automobile Company, Springfield, Mass., has been delivered and accepted by the officials of Middleboro, Mass. The apparatus weighs 7700 pounds and has carrying capacity of 4000 pounds. The equipment includes one 27foot extension ladder, one 18-foot extension ladder with folding hooks and one 10-foot pole ladder for inside work. A 40-gallon chemical tank is located under the driver's seat. There are 200 feet of 75-inch chemical hose and in addition two receptacles and two soda containers, one Detroit door opener, two axes, two play pipe-holders, tool box at the rear and other spaces for storing necessary utensils and clothing. The truck is 48 horsepower and capable of 40 miles an hour and carries from 1000 to 1500 feet of regulation fire hose. It is equipped with Swinehart tires, made by the Swinehart Tire & Rubber Company, Akron, O.

Savannah Shows Decided Economy—Chief Ballyntyue of the fire department in Savannah, Ga, has prepared figures showing that the installation of motor fire equipment in that city has saved the city \$4064.60 during the first nine months of 1912. The maintenance cost for the department during the corresponding perriod of 1911, when horses only were employed, was \$8317.45, this item being exclusive of salaries, as against \$425.295 for the present year. This economy has resulted in the complete motorization of the department.

Washington Has Electric Ambulance—A Detroit electric ambulance, made by the Anderson Electric Car Company, Detroit, has been installed by the Central Dispensary & Emergency Hospital at Washington, D. C. The cost of operation and maintenance has averaged \$15 a month for electric current, while as yet there has been no expense for repairs. The vehicle has answered about 250 calls a month and there has been a decided saving over the old method. The smooth running of the machine has proved its worth to many patients.

Brockton Wants Apparatus—At a recent meeting of the board of aldermen in Brockton, Mass., an order calling for \$20,000 loan for additional motor fire ap-

paratus was referred to the fire department committee. Brockton already has two motor driven combination wagons in its fire service. The new order calls for two additional motor combination vehicles and a tractor for the hook and ladder truck at the central station.

Insurance Men Study Motors—George W. Booth, chief engineer of the committee on fire prevention of the National Board of Fire Underwriters, has been appointed chairman of the committee on automobile fire apparatus of the National Fire Protection Association. This committee is composed of Chief A. V. Rennett, Birmingham, Ala.; Fire Marshal H. W. Bringhurst, Seattle, Wash; Chief John Kenlon, New York City; Chief W. H. Loller, Youngstown, O.; Vice President George M. Robertson, National Fire Protection Association, and G. W. Woodward, Factory Insurance Association, an interesting report is auticipated at the association's annual meeting in New York in May, 1913.

Fitchburg Wants Garbage Wagon—Dr. F. H. Thompson, chairman of the board of health in Fitchburg, Mass., has recommended the purchase of a motor vehicle as the only proper solution to the garbage collection problem. Frequent complaints have made it necessary to consider whether or not some means cannot be devised whereby it will be possible to make the rounds of the city in less time. At present it often takes from two to three weeks to make the necessary collections, whereas Dr. Thompson is of the opinion the work could be done by a motor truck in one or two days.

Motor Oil Sprinkler—The Knox Automobile Company, Springfield, Mass, maker of motor fire apparatus and all kinds of municipal service vehicles, is manufacturing a motor oil sprinkler for the street department of Springfield, Mass. The machine will cost between \$4000 and \$5000 and was ordered because of dissatisfaction with existing street sprinkling methods.

Seagrave Seeks Order—The terms asked by the city of Lowell, Mass, for a combination hose and chemical automobile fire wagon, have been accepted by the Neagrave Company. Columbus, O., maker of motor fire apparatus, which agrees to send a machine of the type specified to Lowell for tests. The car is to be delivered within 90 days.

In the Market—Following are cities and towns which are considering the purchase of motor fire apparatus: Lockport, N. Y.; Butte, Mont.; Portsmouth, Va.; Fort Wayne, Ind.; Ashland, Ore; Washington, D. C.; Keene, N. H.; Albany, Ore; Augusta, Me; Doughas, Ariz.; San Luis Obispo, Cal.; Youngstown, O.; Huntington, N. Y.

New 6mmercial @rAccessories.

Newtone Superior Horn.

To meet the demand for a popular priced electric signalling horn the Automobile Supply Manufacturing Company, 220 Taaffe Place, Brooklyn, N. Y., has brought out the Newtone Superior horn. In it are incorporated the same high grade material and workmanship noticeable of the other horns made by this company and the new design is attractive and well finished. It is economical of current, requiring about 2.5 amperes, and the maker states that a battery will supply current for five months without recharging. All working parts are fully enclosed.

Turner Motor Washer.

A device operating on the compressed air principle is the Turner Motor Washer, manufactured by the Turner Brass Works, Sycamore, III. It is very compact, resembling in shape and construction the gas torch, and instead of a burner a nozzle member is fitted, having a fine opening through which the gasoline or other cleansing fluid is forced. The handle contains the pump mechanism and a few strokes develops a high pressure. By it dirt or grease may be quickly removed from the motor or classis components and places not easily accessible by hand.

Crary Gasoline Lock.

The Crary gasoline lock, manufactured by the Crary Gasoline Lock Company, Detroit, is a device by means of which the supply of fuel from the tank to the carburetor may be shut off by the simple movement of the key, thereby preventing the use of the machine by others than those authorized. The lock is mounted upon the dash or other convenient place, actuates a flexible steel cable enclosed in a tube, and the cable operates a valve member. The lock is a Yale and the key is removable.

Electric Star Headlights.

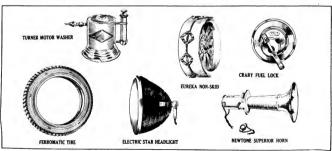
The Milwankee Bronze Casting Company, Milwankee, Wis., is manufacturing the Electric Star headlight, a special lamp designed expressly for commercial vehicles. One of the qualities of the design is that the light is constructed without rives or solder and but one screw is utilized. It is east of silvered aluminum, about 1875 inch thick and the interior is brought to a high polish, which does not tarnish. All leuses are convex and laid in rubber, making them water proof and dust tight. A feature of the lamp is the adjustable device whereby the light may be focussed easily. All connections are Ediswan and with either black ename, brass or nickel trimmings.

Eureka Non-Skid Device.

The Eureka Non-Skid Manufacturing Company, Brooklyn, N. V., is marketing a non-skid device for dual tires and a quality of it is that there are no side or cross chains, the retaining member being located between the two shoes. Suitable traction members are secured to the chain, which is drop forged, as are the plates.

Ferromatic Tire.

The Ferromatic Tire & Manufacturing Company is producing the Ferromatic tire, which is designed to fit any quick detachable or clincher rim and to replace pneumatic shoes. It consists of a shell in two parts. One is a channel, which fits and is secured to the felbee of the wheel. The other, in two pieces, is connected with the channel members by means of springs. A solid rubber tread is utilized for traction member.



Illustrating New Accessories Applicable to the Commercial Vehicle, Repair Shop, Etc.



AINTS·FOR·PROPER MAINTENANCE

A Department for the Owner, Driver and Repairman.



REMOVING BROKEN STUDS.

Removing broken studs is sometimes a difficult task and often the threads into which they fit are injured in the work. At Fig. 2 is illustrated a useful tool, the designer of which was awarded a prize in a competition among mechanics by a foreign publication. The drawing shows the device of .75-inch size, although it may be constructed to any desired proportion. It should save considerable labor in the shop.

The tool is made as follows: Take a piece of .25into round steel about five inches long and turn it down on the outside to the shape shown in the sketch. A 1.25-inch hole is drilled at the tapered end and tapped out to the bottom, taking care to make a clean thread. The tapered end is then screwed onto the outbe tightened and the tool employed as an ordinary stud box. The tool could be used as a die nut if required. When employing it with damaged threads, it should be handled carefully and plenty of lubricant used.

ADJUST SHOCK ABSORBERS.

Many cars of the light delivery type are fitted with shock absorbers and while these devices rarely require attention if properly installed it may be that a readjustment will become necessary. In order to accomplish the work successfully knowledge of the construction of the absorbers is essential.

At Fig. 1 is presented the well known Truffault-Hartford shock absorber and by referring to the draw-

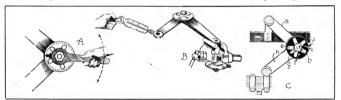


Fig. t—Hillustrating Adjustment of Truffault-Hartford Shock Absorbers: A. Showing How to Use Wrench and Direction of Rotation to Obtain Desired Tension; B. Method of Testing or Resetting with Spring Balance; C. Depicting Components of Absorbers.

side and the stock end squared to take a tap wrench. A one-inch nut is then chased out and slightly tapered to suit the tapered end of the tool. Two saw cuts are then made across the screwed end, and these should go down to the bottom of the tapped hole. The tapered end should be hardened, but care should be taken that it is not made too hard or the jaws will break off in service.

In drawing studs the box should be screwed down onto the stud and the nut on the outside tightened with a wrench. The operation enables the tool to obtain a secure grip upon the stud, which can be removed with the aid of a tap wrench. When used as a stud box the nut should be slackened back until the box is down hard on the stud, and then the nut should ing at C it will be noted that the device comprises a single arm a and a double member b, frictionally joined by an adjusting nut h. The arm a operates between the two sections of the arm b, providing an up-and-down movement, corresponding to that of the frame. The lower arm carries a flanged cover d, forming a cup like space on either side. Within these spaces are located friction discs. These are adjusted by the nut at h. The work of obtaining the desired tension is facilitated by the adjustment dial f having an indicator g. A compensating spring e is provided for automatically taking up the wear and maintaining a uniform friction after the adjustment has been made. The arms a and b are secured to the frame and asle by two frictional adjustable ioints, the function of

which is to offer constant resistance to the vibration of the spring in either direction.

Each absorber has three frictional points: One



Fig. 2-A tacful Tool for Removing Broken Studa Which Muy He Employed as a Die Sul

each at the ends of the two arms and the third where these two members join. The tension is made at this point and a dial and indicator are employed to denote the amount of the tension. When the absorbers are new, the pointer is set at zero and to move it requires a 25-pound pull on a spring balance or ice scale for the standard size. The factory adjustment on the intermediate model is 23 pounds, that of the junior 19, and that on the juniorette 16.

To increase the tension the nut above the pointer should be turned to the right or clockwise with a wrench, and in an opposite direction to decrease the tension. As the pointer moves with the nut, the increase or decrease is denoted on the dial. The method of operation is outlined at A, the drawing showing plainly the proper movements. The maker points out that it is desirable to have a greater tension on the rear absorbers than on the front and that each pair should be adjusted alike.

The absorbers may be tested and adjusted by the method outlined at B. Secure the double arm in a vise as indicated in the drawing and turn the tension nut toward the right until it requires the desired pound pull on a spring balance to move the single or free arm. The brass cover or rim is then marked with a file to denote the position of the pointer.

Next loosen the nut with a wrench, taking care to count carefully the number of revolutions of the tool. Then turn the dial until the zero mark is in alignment with that made by the file. The nut is now turned back the same number of revolutions as was necessary to loosen it. This will give the proper tension with the indicator at zero. The absorbers are then adjusted as previously outlined. If the machine has a tendency to move up and down too freely, the tension should be increased, and diminished if the movement is restricted. Lubricant should not be employed as the friction discs, etc., are self-lubricating,

ANTI-FREEZING SOLUTIONS.

With the approach of freezing temperatures it is advisable to prepare an anti-freezing solution for the circulation system of the water-cooled car if the machine is to be exposed for any length of time or stored in an unheated building. For the benefit of those not familiar with the proper proportions of alcohol, calcium chloride, glycerine and combinations of these, the accompanying tables will be of value. In preparing the car for these solutions it is imperative that the

SOLUTIONS AND PREEZING POINTS.

Cutatum Chimida Degrees F. 1 pound salt—1 gallon water.... Freezing 2 pounds salt—1 gallon water... Freezing 3 pounds salt—1 gallon water... Freezing point 2

Freezing point 18

			enh	ol und					
								Degre	es F
Water	95%.	Alcohol	85				Freezing	point	25
Water	90	Alcohol	10				Freezing		18
Water	8.5	Alcohol	15				Freezing	point	11
Water	80	Alcohol	20				Freezing	point	5
Nater	7.5	Alcohol	25				Freezing	point-	- 2
Water		Alcohol					Freezing		
Vuter	65	Alcohol	35				Freezing		
Water	60	Alcohol	40				Freezing	point-	-28
		Water.	Ale	obol s	nd	tit	cerine.		
								Degre	es F
Water.	955.	Alcohol-	Gly	cerlne.	- 5	%	Freezing	point	28
Vater	99	Alcohol-	Gly	cerine	10		Freezing		25
Vater	85	Alcohol-	Gb	cerine	15		Freezing	point	20
Vater	80	Alcohol	Gla	cerine	20		Freezing	point	15
Nater	7.5	Alcohol-	Gly	cerine	25		Freezink	point	. 8
A'ater	70	Alcohol-	Gly	cerlne.	30		Freezing		
Wuter	67	Alcohol-	GIS	cerlne	33		Freezing	point-	-15
Water		Alcohol-					Freeging		

									Degre	es F.
Water	95%.	Glycerine	5.5					. Freezing	point	30
Wuter	90	Glycerine	10					Freezing	point	28
Water	85	Olycerine	15					. Freezing	point	25
Water	80	Glycerine	20					. Freezing	point	23
Wuter	75	Glycerine	25					. Freezing	point	19
Water	70	Glycerine	20					.Freezing	point	1.5
Water	65	Glycerine	35			٠.		Freezing	point	12
Water	60	Glycerine	40					. Freezing		5
Water	50	Glycerine	50					. Freezing	point-	- 2
Water	45	Glycerine	55					.Freezing	point-	-10

radiator, pipes, pump, etc., be flushed out with water to remove any deposits that may have accumulated. In the maintenance of anti-freezing solutions it is essential that the mixture be tested from time to time to note if the freezing point has not been lowered by evaporation of the solution.

SPRING WINDING TOOL.

In the overhaul of the chassis the replacing of a broken spring may be necessary and when a special size is employed it is difficult to obtain the springs at

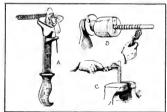


Fig. 3-4 Handy Tool for the Repair Shop: A, the Perfection Spring Winder; B. Depicting Its I se in the Lathe; C. How Operated in the Vise.

the supply house. It may also be necessary to utilize one of greater tension, but not of larger diameter. The Remington Tool & Machine Company, Boston, is marketing a simple and inexpensive device known as the Perfection spring winder which is so constructed that it will wind accurately taper, double taper and right or left hand springs of any length, diameter or



Fig. 4—The Edison Alternating Current Rectifier for Charging Storage Bateries.

pitch from any gauge wire. It is constructed in three sizes having capacities ranging from the smallest to .3125 inches.

The tool is illustrated at Fig. 3, the drawing at A showing how the wire is fed when the device is operated by hand, and that at C when in the vise with a mandred. When utilized in the lathe or drill, an adjustable rotating disc provides for varying pitches as desired. The tool supports the arbor, making possible the winding of the very finest as well as largest springs without kinking, as shown at B.

THE EDISON A. C. RECTIFIER.

A simple and compact device for charging storage batteries where an alternating current is employed, is the Edison alternating current rectifier, produced by Thomas A. Edison, Inc., Orange, N. J., and shown at Figs. 4 and 5. The apparatus is stated by the maker to provide reliable and efficient means of charging hatteries with alternating current and does not require the services of an expert, it being operated easily by anyone familiar with the ordinary snap button type of switch.

The rectifier is practically a simple electro-mechanical valve in that it allows current waves of only one polarity to pass through it to the cells. The simplicity of operation is depicted at Fig. 4 which shows the size B-2, eight amperes capacity, charging an Edison five-cell battery. The rectifier is provided with two wing nut terminals, the positive being indicated by a white 2. This lead is connected to the positive of the cells and the other wire to the negative terminal. A connecting rod and plug provide means for supplying the current from the main line

The apparatus is equipped with a snap type of switch having "on" and "off" positions and by turning the lever to the former the proper charging current flows to the battery. It is pointed our by the maker that a battery may be charged in the same time with an Edison rectifier as with a direct current.

At Fig. 5 is shown the rectifier, size B-4, 10 amperes capacity, charging two sets of batteries. In order to insure correct adjustment of the charging current, a regulating the setat and ammeter are employed as a unit. This equipment in conjunction with a cutout switch and a fuse, inexpensive and easily installed, is recommended by the company when lead batteries are to be charged and different rates of current flow are required.

All rectifiers are provided with terminals for connecting rheostats in the charging circuit and are constructed for 110 or 220-volt circuits in various sizes to meet individual requirements.

REMOVING RUST FROM NICKEL.

Rust spots may be removed from nickel by covering the affected part with vaseline or some similar substance and allowing it to stand for a number of hours, when it should be rubbed with a cloth dipped with amonia. This treatment will remove ordinary rust spots, but if any difficulty develops, they should be carefully dampened with a little diluted hydrochloric acid and quickly wiped dry. The surfaces so treated should be washed with clean water, and when dry, rubbed with polishing powder.

TOOL AND MILD STEEL.

In a great many shops little if any attention is paid to the steel corner, rack or box. In some the most popular place is the floor. Very often machinery and tool steels are piled together in one heap, and when the workman goes to secure a piece he has to guess which is which. There are any number of means of inding this out, but a quick way to test the metal is to touch the end lightly against a dry emery wheel and watch the sparks as they strike. A tool steel gives forth a spark which seems to burst into a bright point of light



Fig. 5-The Edison Apparatus with Rheostat and Ammeter for Service Where Illflerent Charging Rates for Regulard.

as it strikes against the frame of the grinder, while that from machinery steel is merely a dull red incandescent particle. All air hardened steels give forth bright red sparks.

CORRESPONDENCE.

Rending Copper Tables.

(13)—In attempting to 40 rupper tabling to the headlights, that is, to connect the table with the lights, I experienced transble in headlow the plating to conform to the headle to-detect and spoiled several pieces of tubing. What is the best way to handle the material? Matther, Masse, New, 17.

The trouble was doubtless due to the fact that the tuning was not annualed. Annualed tubing should be used and piping may be annualed easily by heating to a dull red and plunging it into water. Brass is superior for conducting acceptance as the chemical action set up on copper results in clogging the tubing.

Troubiesome Vibraling Coil.

(19)—We have a small randoul, four-cylinder, which is fitted with a four-unit coil and storage battery, which we employ for errand work. The coil has been giving considerable trouble as two and all the properties of the collection of the random and the collection of the collection of the collection of the an expert requirman look II over and he states that the coils have broken down. Tried another coil and the entire ran perfectly. As I do not early to expend mones for a new coll, which come? It would file to know how the IN-DNOMATION.

Hartfurd, Conn., Nov. 20.

The best method would be to fit a new coil. This should not be done, however, until the old member has been thoroughly examined by an expert. The writer suggests that the coil be sent to the maker, stating the trouble experienced, and the manufacturer will advise as to the cause and cost of repair. The make was not stated, but the address will usually be found upon the coil.

tdjnsiments of Remy Magneto.

(20)—What attention if any, is necessary for the proper operation of the Henn magneto? There is one fitted to truck I drive and care for and I should like to have information at to elling and possible adjustment. The magneto is working line, but I want to be prepared if anything door we Checked, N. Y. Nov. 8.

The Remy magneto requires no attention other than oiling and the places are plainly marked upon the instrument. A few drops of lubricant about every 1000 miles is recommended by the maker. Too copoins oiling will not injure the magnetos, but should be avoided. The cam oiler wick, shown at Fig. 6, which bears upon the cam at all times, providing a thin film of idl, should be examined from time to time to see that the wick loes not become dry. This wick is lubricated through an oil aperture as will be noted.

Be careful not to flood the circuit breaker housing with labricant as the use of too much oil will tend to throw it upon the platinum points. Oil or grease upon these members tends to destroy the metal as the labricant furnishes a volatile material which will cause areing and rapid depreciation of the platinum. The efficiency of the magneto will also be impaired.

The platinum contact points will not require attention unless the surfaces become uneven through the application of oil, etc. They should always have a good, square, flat contact at the time of breaking, which operation is performed by the can, a function similar to the contact roller of the conventional timer in the battery and coil systems of ignition. If the points become uneven they should be trued carefully with a small piece of fine emery cloth or a fine flat

Proper adjustment of the pourts is essential for successful operation of the magneto. The opening should be set primarily at about .025 mch. If the motor misses at slow speed with the spark retarded, the contact screw should be adjusted a notch at the time to the left, or "out," until the engine fires evenly. If the motor misses at high speed with the spark advanced, the contact screw should be screwed in, or to the right, until satisfactory operation is secured.

It is important that the wires be inspected to make sure that all connections are tight and free from contact with motor parts, as chaing is liable to ensue, causing short circuitig. Leads and cables should not be allowed to become saturated with oil or grease, or exposed to water. If in the overhaul the wires must be removed it will be advisable to mark these if the colors have become indiscernible.

There is no necessity of taking the magneto to



Fig. 8-Illustrating Components of Remy Magneto Breaker
Box and Parts Requiring Attention.

pieces in the event of trouble as all that may be done by the movies is to clean the platinum points and adjust them as outlined, an operation that may be performed without tools. In the event of serious trouble such as damage through accident, the magneto should be shipped to the nearest service station, a number of which are maintained by the company.

Moine and tieneratur.

(21)—What is the difference between an electric motor and a generator and why are two separate machines employed for lighting and starting a car? INTERESTED. Toledo, O., Nov. 21.

The difference between an electric motor and a dynamo or generator is that the former is energized by electricity and transmits power, while the dynamo generates or makes electricity. For ear lighting a generator or dynamo is employed for generating current for the lamps and for charging a storage battery. The motor starter is supplied with current from the battery. In some systems, the Deleo for instance, the motor and dynamo are combined and the desired results are obtained by the windings.

LOAD CARRYING WEIGHTS FOR TIRES.

A TOPIC of natural interest to all owners and operators of motor driven commercial vehicles is the discussion of methods to prevent the wear and tear of solid rubber tires. C. W. Martin, sales manager of the Goodycar Tire & Rubber Company, Atorn, O., admits that this part of the equipment is the most serious item in the cost of truck up-keep. He holds, however, that there are many apparently insignificant details in the operation and care of a power wagon which have an important bearing upon the life and service of its tires. The following observations are a result of his investigation of the subject:

Natural or ordinary wear under normal conditions, causing abrasion, is attributable principally to tractive effort, starting and stopping, or skidding. When these elements are not attended by others, which will be described later, a solid rubber tire can be expected to give the maximum service and to wear out legitimately.

Undue abrasion may be caused by wheels being out of alignment, resulting in a tire wearing down smoothly and prematurely, thus more than likely causing an impression with the truck owner that the tire is not all that it should be in the matter of quality and workmanship. Disalignment sufficient to produce this effect in at least some degree may be so slight as to be unnoticeable in the absence of special attention.

Wheels out of alignment are found very frequently, particularly front wheels. Usually these result from striking glancing blows against curbstones or any other obstruction, causing bent axles, wrenched steering knuckles, or dished wheels. The wear is the same as would be obtained by holding the tread of the tire on a swiftly moving grindstone and revolving it slowly. Turning the front wheels by means of the steering apparatus when the truck is not in motion also has its bad effect.

Disalignment may be detected by measuring the distance between rims of the two front or two rear wheels at the extreme fore and aft points, care being exercised to see that the front wheels, when measuring them, are pointing straight ahead or parallel with the body of the truck. The distance at fore and aft points will be found to be the same if the wheels are in perfect alignment.

Travelling over exceedingly rough pavements and sharp stones, such as are found on newly macadamized roads, produces cuts into which sand and grit work, slowly enlarging the gap and eventually causing the destruction of a solid rubber tire. Continual running in car tracks invariably results in a similar manner, as the edge of the tire, or the very small portion which runs on the rail is earrying the load intended for the whole tire. Also, a shearing effect is thus produced which is very injurious to the tire's fastening. Cutting also may be caused by careless driving on streets in normal condition or by careful driving combined with overloading, or because of bad streets.

Disintegration may be due to the tire being allowed to stand in oil in the garage. Oil has a chemical effect upon rubber which is extremely injurious.

In this day of increasing popularity of demountable tires and standard wheels as adopted by the Society of Automobile Engineers, it is important that wheels be of proper dimensions and that all bolts be thoroughly tightened so as to prevent circumferential movement of the tire on the wheel.

A tire will fail to stand up under overloading, which strains the fastening and crushes the tread, causing bruises and chafing. Speeding virtually has the same results as overloading, producing shocks when riding over obstacles of various kinds, which bruise and cut the rubber.

As a result of these investigations and after a thorough scientific analysis of all conditions and requirements in its experimental engineering department, the Goodyear company has adopted and recommends the graduated table of carrying weights presented herewith. It will be noted that tires are rated according to their diameters as well as their cross sectional size, and it is maintained that speed has been given proper consideration. Mr. Martin believes that a careful observation of this table will have its effect in reducing truck tire mileage cost.

Graduated Table and Tire Carrying Weights.

on Singles	32" lbs.	34"	36"	38"			
	11va				40"	42"	
		Ibs.	1bs.	1bs.	1bs.	the.	mph.
	450	475	500	525	550	575	20
**	670	710	750	790	N30	870	20
**	5000	950	1040	1056	1100	1150	20
**	1130	1190	1250	1310	1379	1430	18
**	1350	1425	1500	1575	1650	1725	16
	1800	1900	2001	2100	2200	2300	14
**	2250	2375	2500	2625	2750	2875	12
**	2700	2850	2000	3150	3300	3450	10
Punl	1125	1188	1250	1312	1375	143%	18
**	1675	1775	1875	1975	2075	2175	18
**	2250	2375	2590	2625	2750	2875	16
**	2825	2975	3125	3275	3425	2575	1.4
**	3375	3560	375e	3944	4125	4319	13
	4500	4750	5000	5250	5500	5759	1.2
**	5625	5940	6250	6565	6×75	7150	1.0
**	6750	7125	7500	7875	8250	8625	10
	yal	" 1360 " 1350 " 1800 " 2250 " 2700 " 1125 " 1675 " 2250 " 2825 " 3275 " 4500 " 5625	" 1350 1500 " 1350 1425 " 1350 1425 " 1350 1425 " 1250 2575 " 2750 2575 " 2750 2757 " 2750 2757 " 2750 2757 " 2750 2757 " 2750 2755 " 2755 2755 " 4506 4750 " 5625 5840	" 130 950 1044 " 1350 1425 1500 " 1350 1425 1500 " 1250 2425 1500 " 2700 2550 2375 2500 " 2700 2550 2560 2460 " 1250 1755 1876 1250 " 1675 1755 1755 2470 " 2755 2550 2755 2470 " 2755 2550 2550 2550 " 2755 2560 2555 2560	" 310 550 1000 1050 1050 1050 1050 1050 1	" 909 950 1004 1056 1100 " 1136 1150 1255 1310 1375 " 1136 1150 1255 1300 1255 1310 1375 " 2250 1257 2250 2008 3150 2008 " 2250 2250 2008 3150 2008 " 2250 2250 2008 3150 2008 " 2250 2250 2250 2008 2008 3150 " 2250 2250 2250 2008 2008 2008 " 2250 2255 2500 2008 2008 2008 " 2250 2255 2500 2008 2008 2008 " 2250 2255 2500 2008 2008 2008 " 2250 2255 2500 2008 2008 2008 2008 " 2250 2255 2500 2008 2008 2008 2008 " 2250 2255 2500 2008 2008 2008 2008 " 2250 2255 2500 2008 2008 2008 2008 2008	" 390 950 1000 1056 1100 1150 1150 1150 1150 11

New Advertising Firm—An evidence of the inrecasing attention being given to the most efficient methods of marketing engineering and technical products appears in the announcement of the formation of Wightman and Richards, technical department of Jos, A. Richards & Staff, Tribune building, New York City, representing the association of Joseph A, Richards, Lucius I, Wightman and Paul Morse Richards, Joseph A, Richards is the head of the agency having his name, an institution which was founded by Joseph H, Richards in 1872. Mr. Wightman is an engineer who has specialized in advertising and marketing machinery and engineering products for some years. Paul Morse Richards is a publisher, sales manager and advertising man of wide experience.

FOREIGN TRUCK NOTES OF INTEREST

LACRE COLLIERY RESCUE CARS.

First Vehicles Produced to Comply with the Recent Act of the British Parliament.

In compliance with an act of the British Parliament, passed in 1910, which makes it compulsory upon all colliery operators to maintain a motor vehicle in constant readiness for the supply and maintenance of ambulances, at least two rescue stations have acquired machines made by the Lacre Motor Car Company, Ltd., London. One of these is shown in an accompanying illustration, this being installed at the Rhymney Valley station, while the other is at the Aberaman station.

These machines are fitted to the regulation 38 horsepower chassis produced by the Lacre company,

and the most interest naturally attaches to the body equipment. As will be noted the general appearance is that of an ambulance, and it differs principally in the provision for carrying the necessary oxygen plant and other rescue appliances. These cars are the first to be placed in service in combliance with the law.

The interior is arranged to commodate 11 men. Separate compartments are provided for 11 sets of draeger outfits, these being disposed along the sides in the spaces to which the covers have been opened in the photograph. Four oxygen cylinders are carried in the com-

partment directly underneath that for the draeger outfit back of the driver's seat. Four pulmotors are located immediately under these, and at the extreme rear. Tools are carried in another compartment directly over that occupied by the draeger outfit back of the driver. A well is accessible from the interior by litting four hinged doors, and in this are carried potash cartridges and hand lamps. Provision also is made at the side of driver's seat for pump and extinguishers.

PRIZES FOR TRACTION PLOWS.

Splendid Opportunity Offered American Manufacturers in Connection with South African Show.

The Port Elizabeth Agricultural Society of Port Elizabeth, Cape Colony, South Africa, has decided to offer cash prizes in connection with tests for traction plows at its annual show in the spring of 1913. The prizes are to be three in number, the first, \$500, for the best motor tractor; second, \$125, for the best disc plow suitable for direct traction; third, \$125, for the best mold board plow, all to be shown at work. The field tests are to be held under the direction of the Port Elizabeth Agricultural Society, but the Cape Field Trial Association will probably be requested to assume the active supervision and arrange details. All traction engines taking part in the contests will be required to be placed on exhibition at the show.

This display is one of the best in South Africa and is attended by thousands from all over Cape Colony, Orange River, Transvaal, Natal and even from Rhodesia. This test of traction plows, the first to be held in South Africa, is attracting much attention and will un-



Lacre Vehicle of British Manufacture Fitted for Service With Colliery Reseue Station.

doubtedly be the feature of the exhibition. The most successful machines will have a great opportunity in South African markets. Vast tracts of veldt hitherto inbroken will be cultivated during the next few years and in this development work the traction plow is destined to play an important part. United States Consul E. A. Wakefield of Port Elizabeth issues a word of advice and of warning as well to American producers. He says:

"American manufacturers should be alive to this opening with a determined effort to make a creditable and satisfactory exhibit. While the show takes place the first week in April, the tests will be held March 24-29. Thirty-five to 40 days should be allowed for transit from New York, with reasonable period for clearing, landing and preparation after arrival. A thoroughly efficient man should accompany the machine as

un and Google

operator at the test and demonstrator at the exhibition. No details which might possibly interfere with the tests, such as spare parts, careful packing and early shipment by sure route, should be neglected."

BRITISH DAIRYMEN INTERESTED.

Motor Delivery Wagons Play an Important Part in Recent Exhibition at Islington, England.

The 37th annual dairy show, under the direction of the British Farmers' Association, was held recently at Agricultural Hall, Ishington, England, and was attended by the usual large number of farmers and others who were more or less interested in the exhibition. The question of transport is one which closely concerns dairymen, and a number of motor manufacturers exhibited vehicles suited to the requirements of this particular industry.

Four vehicles were exhibited, among them being the Studebaker 1100-pound delivery van, marketed by



Type of Chassis Selected by French Army for Hauling Machine Guas.

the British Studebaker Corporation and made by the Studebaker Corporation, Detroit, Mich. This attracted particular attention and seemed to be the favorite inasmuch as many of them are in service in England and giving remarkably good results in the transportation of light loads. The three additional machines exhibited were of the three-wheel class, one being a 1500pound gasoline machine, while the other two were 900pound electric vehicles, made by the Torpedo Motor Company of Germany.

HAULING GUNS BY MOTORS.

French Army Adopts Four-Wheel Driven Tractors as Result of Recent Military Manoeuvres.

As a result of the recent military manoeuvres in France the French minister of war has decided that in the future the gun carriages for the largest cannon shall be drawn by motor tractors of the fourwheel drive type. The troops in Morocco will be supplied with these vehicles immediately. An accompanying illustration shows one of the new tractors engaged in the recent manoeuvres.

The motor is a six-cylinder unit with bore of 3.9 inches and stroke of 5.5, rated at 35 horsepower at 1000 revolutions a minute and 45 at 1400. The cylinders are cast separately, but are coupled in such manner as to form a common water chamber, presenting the advantages of ease of operation, assembly and replacement of separate cylinders and the simplicity and compactness of the block easting, it is maintained. Ionition is by high-tension magneto.

The clutch is a multiple disc, and the transmission provides four forward speeds and reverse. It should be stated that the four-wheel drive is accomplished by means of a differential on each sale and a third between the two axles. The transmission is without joint of any kind, yet it permits free movement of the axles at their attachment to the chassis, and the steering arrangement is such that it assures equal and

gement is such that it assures equal and simultaneous adjustment at all four wheels

Two sets of brakes are fitted, in addition to the braking effect possible with the motor. Each lad of the differential shaft carries a drum, on the interior of which are friction shoes, actuated by pressure on the pedal. The hand operated members are on the wheels. These latter are of cast steel, with rubber tires, single in front and dual in the rear. The suspension is by means of four springs mounted in grooves on the chassis and joined onto axles.

Under the chassis in front is fixed a windlass, this being placed in a horizontal position with reference to

Under the chassis in front is fixed a windlass, this being placed in a horizontal position with reference to the axle. This is operated by an endless screw, the shaft of which is carried by a set of gears in front of the transmission case. The drum of the windlass carries sufficient steel cable to permit of the tractor being extricated from any difficult situation. At the rear is a hook with an elastic spring yoke, and hooks also are fixed to each end of the frame.

MOTOR 'BUSES IN INDIA.

Vehicles of the Gasoline-Electric Type Meet with Decided Success Among the Natives.

An accompanying illustration presents two of the Tilling-Stevens gasoline-electric omnibuses produced by Tilling et Stevens in France and utilized with splendid success in British India. They are similar in most respects to those of the same make which have been used for some time in London, with the exception of the body equipment, which in this case is arranged to seat 34 persons, disposed in much the same manner as in the open street cars in this country. The London vehicles are of the enclosed type.

The gasoline motor is a four-cylinder unit, with bore of 4.13 inches and stroke of 4.92. Cooling is by water, circulation being by pump. Ignition is by true high-tension magneto. The electric motor is designed to deliver from one to 25 kilowatts at a speed varying from 350 to 1400 revolutions a minute, the control being by levers located within easy access of the driver.

GENERAL NEWS FROM ABROAD.

Motor Trucks in China—Several of the merchants in the Far East, according to an American consul, are contemplating the establishment of a forwarding company having for its main purpose the transportation of heavy cargo between various bouits in a local city.

Application has been filed with the government for the formation of a joint stock company and if a successful issue results it is likely that 10 trucks will be needed for the work. It is thought that motor vehicles having capacity of seven tons will be needed. It is advisable that American manufacturers send catalogues, price lists, etc., to a person named in the report, Full information can be obtained of the bureau of foreign and domestic commerce, Washington, D. C., by reference to file number 9849. Duplicate catalogues should also be sent to the consul submitting the inquiry.

Electric Machines in Berlin-

The Berlin, Germany, street cleaning department is planning to introduce electrically propelled street sweepers and to supplant the horse drawn equipment by degrees. The department has for some time had a number of storage battery driven street washers at work and has been so pleased with them that it is decided to strengthen the fleet. The budget of Berlin for 1913 will include estimates for two self-propelled road sweepers.

Gramm Truck in Cuba—The Gramm Motor Truck formunay, Lima, O., maker of Gramm trucks, has found a profitable field of endeavor in Cuba and contracts were recently signed for the delivery of six trucks at Ilavana. The schieles will be of the standard Gramm five-ton model, with electrically operated hump hodies for use by a contractor who does a large amount of excavating in the Cuban capital. It is said there is also a field in Cuba for passenger carrying vehicles owing to the constant increase of traffic. A sup-

gestion has been made that the railway authorities should purchase motor trucks and run them in the interests of the commercial community.

Wants Traction Plows—A report from an American consular officer states that since the amouncement of the prize competition for traction plows to be held in South Africa, there have been many requests at his office for catalogues and information. Two firms are desirous of getting in touch with a reliable company producing efficient motor tractors capable of being operated without requiring too much water for cooling purposes, as in many sections water is a searce commodity. The tractor and plow units be separable and the tractor available for other purposes. Full information may be obtained by addressing the bureau of domestic and foreign commerce, Washington, D. C.

Favors American Machines—Supplementing a previous report regarding the establishment of a motor



Two Tilling-Stevens timoline-Electric Omnibuses in Service in British India.

passenger service between two points in his district, an American consult reports that the firm which is interested in this proposition has written of the indisposition of American manufacturers to demonstrate their cars or to guarantee them. The firm desires proposals and prices should include cost of demonstration. The firm is in the market for two motor trucks of 16 to 18 passenger capacity. Four more are to be ordered assoon as the successful car has been found. Information can be secured by referring to file number 982 of the lurreau of foreign and domestic commerce. Washington, D. C.

International Motor Exhibit—An international exhibition of industrial motors will be held at Parma, Italian Department of Emilia, from June to October, 1913. The competitive exhibition will be divided into three parts as follows: An international competition of motors for deep plowing; competition of internal combustion motors burning heavy oils; national

competition of internal combustion motors using oil, petroleum and gasoline as fuel and adapted to agricultural use. In the first competition there will be three contests, according to the depth plowed—eight to 10 inches, 12 to 14 inches and 16 inches or over. In the other two contests the trials will cover six hours at full force and heavily loaded under working conditions, six hours half-loaded, and three hours unloaded. Applications for entry in the tests should be received before March 31, 1913, by the Italian Touring Club, via Monte Napoleone 14, Milan, Italy.

Flat Machines in Australia—Tooth & Co., Ltd., of Sydney, Australia, largest brewery house in the commonwealth, employs during the busy season about 350 horse drawn vehicles in its delivery work. It recently purchased through Garratts, Ltd., sole agents in New South Wales for Flat cars, a 30 horsepower four-cy-linder three-ton Flat motor truck and as a result of the reliability and economy of the machine it has placed an order for 10 more similar vehicles. The company intends, it is said, to increase its motor fleet to 30 machines during the next year.

English Police Prison Van—The Huddersfield police of Clayton & Co., Ltd., a motor van for the conveyance of prisoners from that city to Wakefield. The body of the machine is built to accommodate eight prisoners, four on each side of a central division, while extra seats are provided at the front and rear. There are two windows on each side near the top of the vehicle and one in the upper panel of the door at the rear, all of them being heavily barred to prevent any possible escape of convicts.

Noteworthy Deep Plowing in England—A Marshall oil tractor which has been engaged in deep plowing and sub-soiling operations at Gainsborough, England, has attracted exceptional interest, in view of the fact that the tractor, which was designed especially for preparing waste land for the cultivation of sugar beets, plowed two furrows, 22 inches wide, to a depth of 19 inches, while the plow was fitted with two subsoil times which penetrated to a depth of six inches below the bottom of the furrows. This remarkable exhibition in deep plowing is particularly noteworthy, as it is the first attempt that has been made in England to plow so deep as 19 inches, while in all probability it is the first machine made in that country for working at that denth.

New Motor Trucks for German Army—The Bussing Works of Brunswick, Germany, has supplied two motor wagons to the automobile battalion of the German army, designed in accordance with the latest military regulations and propelled by 35 horsepower motors. The main difference between the 1913 army type of vehicle and that previously employed is in the overall width, which has been reduced. This reduction was rendered necessary on account of the narrowness of some mountain roads, especially in the Ardennes and Vosges. The machines have been designed to carry a load of four tons and to haul a trailer carrying two tons. The arrangement of the hand brake and change speed levers is placed more conveniently for the driver than was formerly the case and the hood affords fine protection even in the most inelement weather. The machines are equipped with the Bussing patent double coil suspension of the front axle and with spring drawbars. Chain drive is employed, being considered the most suitable for heavy vehicle work.

Glasgow's Sweeping Machine-A motor sweeping machine, built by Thomas Green & Sons, Ltd., Leeds, is in service with the city of Glasgow, Scotland, having been secured a short time ago and is reported to be doing good work. That the officials of the city appreciate the advantages of motor vehicles is shown by the number that have been installed in the various branches of the service. A watering machine has been added to the equipment and bids are being asked for a three-ton gasoline wagon to be used for collecting refuse from the extended areas of the city. Experiments have been carried on with motor mowers for the parks department; the sanitary department is acquiring several light vans and the salvage corps, which has been wholly dependent upon horses, has two 50 horsepower vehicles ordered for delivery soon,

Paris Company Installs Electrics—The General Omnibus Company of Paris, France, is to make extended trials with electric omnibuses. The first machine will be of French make, but fitted with the Edison storage battery. The Paris company operates about 800 motor cabs and some horse drawn carriages, but by the terms of its recently renewed contract the latter are to be superseded at the end of the current year by mechanically propelled vehicles. That the French constructors should feel compelled to utilize an American storage battery is of particular interest in this connection.

Large Hungarian Mail Fleet-The Hungarian postoffice department will, within the next six years, have acquired 500 automobiles of various types, for the government mail service. Among those to be secured will be 250 letter collecting voiturettes of eight horsepower; 100 parcel vans of 16 horsepower; 75 parcel and passenger vehicles of 30 horsepower, and 75 parcel vans of 30 horsepower. The government, through the minister of commerce, announced, however, that it will only accept bids from home makers. If American producers should have a producing branch in that country there is no doubt that they could secure the business, inasmuch as the Hungarian manufacturers can make no headway against foreign machines without government assistance. The voiturettes, it is stated, will supplant motoreveles with sidecars.

"WE'LL DELIVER IT TODAY."

KisselKar Enables Merchant to Make and Keep This Promise to Afternoon Customers

A western merchant who recently replaced his horses with KisselKar motor trucks has built up a systematic campaign of advertising around the new and quicker delivery service. The slogan he has adopted is, "We'll deliver it today," and this has been featured on his wagons, in his show windows and in the newspapers of his city. The results, the merchant states, have proved immensely profitable. His enterprise has solved one of the weakest points in his business—the inability to promise delivery on the day of purchase.

"Formerly we were obliged to make a rule that no promise of delivery the same day should be made to customers making purchases in the afternoon," he says. "Many sales were lost because of this necessity. Now we can positively insure delivery before night of articles bought up to 4 in the afternoon and in some cases later."

TRUCKS PROVE WORTH.

Now Used to Haul 90 Per Cent. of All Pianos Moved in Chicago.

When motor trucks were first introduced in the business world, doubt was expressed by piano dealers regarding its practicability for moving pianos, for which exceptional care must be exercised in handling to deliver in perfect condition. It was claimed that motor trucks did not possess the easy riding qualities of horse drawn vehicles. In spite of all these claims, which later experience has shown were without foundation, some of the earlier Gramm trucks, made by the Gramm Motor Truck Company, Lima, O., were sold to piano dealers. Practically all of them are still in service and others have been ordered by the owners.

C. E. B. Adams of Adams & Engs. Chicago, says that 90 per cent, of the pianos now delivered in Chicago are being hauled on trucks. This shows how largely the mechanical transport has replaced the horse and wagon for piano delivery in that city and these conditions may be said to be approximately true of all the larger centres of the country.

NEW CANADIAN COMPANY.

Secures Assets of Clinton Motor Car Company and Will Make Trucks and Pleasure Cars.

The Saskatoon Clinton Motor Car Company, Saskatoon, Can., has been formed with a capital of \$500,000 to purchase designs, ctc., and complete assets of the Clinton Motor Car Company, Ltd., Clinton, Ont., and will manufacture pleasure cars, trucks and light delivery wagons which have been developed by the

Clinton company and which have proved so very successful in western Canada. The company has erected buildings having an aggregate floor space of 80,000 square feet and it is planning to be in the market with a full line of cars and trucks for the winter shows.

E. D. Cleghorn will be general manager and C. W. Whitmore, late vice president of the Toronto Auto Top & Body Company, general superintendent. The provisional directors are: William Jackson, president; Christopher Keane, vice president; Ernest Holmes, secretary-treasurer; Joseph H. Holmes and E. D. Cleghorn.

COLLEGE AUTOMOBILE COURSE.

University of Missouri Would Prepare Men for Engineering Department of Industry.

The University of Missouri will establish a department of instruction in automobile engineering if a sufficiently large appropriation can be obtained from the state legislature. So far as known this will be the first school of its kind. Stewart McDonald, vice president of the Moon Motor Car Company, St. Louis, Moo, maker of Moon pleasure and commercial vehicles, will be the professor in charge of the department.

Mr. McDonald is a graduate of the engineering department of Cornell University and is considered one of the best automobile engineers in the country. The proposal to establish a college course of the kind suggested is regarded as a testimonial to the growing inportance of the automobile industry in the United States and especially in the West.

Federals in Automobile Industry—Members of the allied automobile trades who feel called upon to use the service of motor trucks have in many instances purchased the Federal one-ton delivery machines, made by the Federal Motor Truck Company, Detroit. Among those who have purchased Federals are: Hupp Motor Car Company, Abbott Motor Company, K-R-I-T Motor Car Company, Briggs-Detroiter Company, automobile manufacturers; Genmer Manufacturing Company, Kelsey Wheel Company, Firestone Tire and Rubber Company, Goodyear Tire & Rubber Company, Herbert Manufacturing Conjoany, Russell Wheel & Foundry Company, Russell Motor Axle Company and McCord Manufacturing Company, makers of automobile parts and accessories, all of Detroit.

Perkins & Corliss, an automobile firm in Gloucester, Mass., recently inangurated a 'bus line for the purpose of taking summer visitors at the quaint fishing town to the points of interest at Bass Rocks, Eastern Point and East Gloucester. It is almost needless to say that the success of the venture has assured its adoption as a regular summer institution. Packard machines, made by the Packard Motor Car Company, Detroit, are being used.

THE A B C OF MOTOR TRUCK IGNITION.

Part IV—Outlining the Various Systems Utilized with the Commercial Gasoline Vehicle,
Their Components and Application in Practise—Explaining the Construction and
Operation of the Induction Coil and Function of the Timer.

By C. P. Shattuck.

IT HAS been explained that the high-tension current utilized with the jump spark coal system of ignition is secured from a low-tension current supplied by a group of dry cells, storage battery or mechanical generator registering approximately six volts, and that the voltage is greatly augmented by induction. This building up of the current or electrical pressure is essential to enable it to jump the spark across the space or gap existing between the electrode and shell of the spark plug.

Although there is little the novice may undertake in connection with the commercial type of induction coil, other than to clean the platinum contacts and ad-

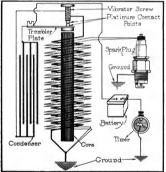


Fig. 14—Components of the Induction Coll, Showing Its Windings and Arrangement of Primary and Secondary Circuits.

just the vibrator, a knowledge of its components and operation will be of value in studying other high-tension systems, such as the magneto, etc.

Components of Induction Coil.

At Fig. 14 is presented a sketch of an induction coil, showing the different windings, also the primary and secondary circuits and other components necessary for the operation of the system. The primary winding or coil is indicated by the heavy wavy lines and it will be noted that there is a smaller number of turns than with the fue or secondary winding. The primary is of comparatively coarse copper wire and the coils are very well insulated from the secondary.

The latter is a very fine, insulated wire, and the number of turns greatly exceeds that of the primary. Upon the length of the wire depends the electrical pressure; that is, any pressure of current may be generated in the secondary winding by varying the proportions of the two windings in the coil and the amount of current passing through the primary.

Primary Circuit.

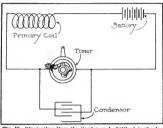
The components of the primary circuit include a suitable switch for closing the circuit, a chemical battery or a mechanical generator, and a suitable make and break mechanism, usually operated by the magnetism of the core, termed the vibrator. This making and breaking of the primary circuit generates a very high electromotive force in the secondary winding, producing a spark at the gap of the plug as previously explained. Other components of the coil include the iron core, around which is wound the primary and secondary windings, the condenser, vibrator serves and trembler plate or blade.

Construction of Vibrator.

With the jump spark coil it is necessary to incorporate some means for interrupting or breaking the primary circuit in order to produce the desired spark, or in other words to build up the electrical pressure required to force the current to bridge the air space of the spark plug. The device is known as the vibrator and consists of a flat spring to which is secured a soft iron disc of the same diameter as the iron core. Upon the spring is placed a small platinum or iridium disc, and an adjustable serves is provided with a similar member and so located that the two points meet or contact.

These members are indicated clearly in the drawing presented at Fig. 16, which illustrates the vibrator construction of the Splitdorf induction coil. It will be noted that the contact spring is secured to a post member to which is also fastened the bogert hammer member. The upward movement of the hammer is limited by a stop and normally it rests against this. An adjustable ratchet screw is suspended by a bridge, not shown in the drawing, and is fitted with a platinum point which normally is in contact with the platinum member on the contact spring. The function of the ratchet screw is to provide means of securing the proper contact between the platinum points, this being determined largely by the volume of the primary current; that is, the arrangement is such that the points may be adjusted so as not to consume an excessive amount of current. The adjusting and care of these members will be taken up in detail and in logical sequence.

The action of the vibrator is as follows: When



Pig. 15-illustrating Haw the Candenser in Utilized in the in daction Coll.

the contact points are together the circuit through the primary is closed. If a source of electric current were connected through the primary terminals of the coil the electricity flowing around the core through the primary winding would make a magnet of it. The core or magnet attracts the hammer member which moves downward, depressing the contact spring and separating its platinum point from that on the adjusting screw. Upon the current being interrupted the eore ceases to be a magnet, and the hammer being no longer attracted, is released and moves upward, allowing the contact spring point to make contact with the other member, again completing the primary circuit. This series of making and breaking continues so long as current flows and is interrupted in the primary circuit.

Object of the Condenser.

Reference has been made to the condenser the object of which, in connection with a continuous spark coil, is to reduce pitting and sparking of the contact points, thereby prolonging their life, as well as to insure the continuous operation of the contacts. The theory is that the electro-magnetic force of self-induction which is largely instrumental in causing the spark at the break of the contact points, will expend most of its energy in charging the condenser, thus causing the break spark in the primary to be less and the current to become zero instantly. The real object of placing a condenser across the contacts of a spark coil is to absorb any extra current induced in the primary coil, due to the breaking of the circuit. This extra current would otherwise tend to prolong the magnetization of the core beyond the desired limit and thereby lower the frequency of vibration so as to make the coil not adaptable for service with a high speed motor.

Construction of Condenser.

The insulating material utilized in the construction of condensers is divided into three general classes glass, mica and paper. The glass is used in experi-

mental work, while for ordinary commercial uses the mica condenser is utilized only on very expensive magnetos, where cost is a secondary consideration. The paper type is most commonly used in ignition work and the manufacturer has perfected the process to the point where it is highly satisfactory. There are two principal types of paper condensers now heing made, one being termed the separate sheet and the other the coated.

The separate sheet method consists of employing alternate sheets of paper and tinfoil, then rolling the mass into a flat bar. Alternate sheets of the foil are connected to one terminal, and the remaining sheets to the other, the positive and negative poles of the circuit being connected to the respective poles of the condenser. The connection and utilization of the condenser are depicted at Fig. 15.

The connections to the tinfoll, which is usually about 2005 inch thick, are by inserting near the middle of the foiled strips, pieces of annealed sheet copper about 201 inch thick and 3 inch wide, so that the real terminal lead wires may be soldered to them after the condenser is assembled. The copper is not secured in any way to the surface of the tinfoll, but makes contact in the pressing operation. Considerable care is exerted in selecting the materials for the condenser which is subjected to severe tests before being incorporated in the coil box or housing.

It will be noted that the condenser has two terminals which are connected, one on either side of the point at which the break occurs in the primary circuit. When the latter is closed or completed the condenser is short circuited, but when the circuit is broken and the induced current begins to flow, instead of jumping across the gap and thereby overcoming the effect upon the secondary circuit due to the quick break of the primary, it passes into the condenser and does not cause a spark. The current flowing in this way into the condenser passes out again and into the circuit when the latter is completed the next time.

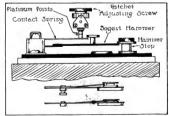


Fig. 16-Depicting the Vibrator Parts of an Induction Coll, Visa Types of Vibrators.

Referring once more to Fig. 14, it will be seen that one primary and one secondary wire are coupled together inside the coil box when three terminals are



Fig. 17-J. & B. Single-Cylinder Coll with Cover Removed in illustrate Vibrator.

employed for coupling the coil to the external circuits, of which there are two, distinct from each other. The battery lead or terminal goes either to the contact screw or the vibrator, as the case may, the other primary being coupled with the part of the vibrator not connected to the battery, save through the medium of the platinum countact points.

The secondary circuit is distinct from the primary and includes the spark plug, while the primary current is derived from the battery and passes

through a timer or commutator, the function of which is to insure that the spark will be produced at the proper instant in the cylinder. The complete circuits are shown at Fig. 14 and a little study will enable the reader to become familiar with the components and their relation to one another.

Types of Coils.

Conventional types of jump spark coils are depieted at Figs. 17, 18 and 19, these being the J. & B. one-cylinder, the K-W box or marine, and the Connecticut four-cylinder unit. Coils may be constructed for any number of cylinders although in common practise the number of units is limited to six. By referring to Fig. 19 it will be seen that each cylinder of the four-cylinder motor has a separate coil and that the four units are incorporated in one box or housing, but the primary current from the battery is controlled by one switch. Each unit is adjustable; that is, the vibrator may be set to obtain the greatest efficiency with a minimum consumption of current. A quality of this design, as well as of the coil illustrated at Fig. 17. is that the construction is such that the unit may be removed from the coil housing without detaching any leads. This is made possible by spring like contact



Fig. 18-The K-W Single-Cylinder Coll of the Hox Type I tliized Largely with Marine Motors.

members and the design enables the replacement of a defective unit with a new one without dismantling the coil proper. It also permits of the testing of the ignition, the various methods for accomplishing which will be taken up in logical sequence.

Non-Vibrating Coils.

Although the low-tension or make and break system of ignition has been succeeded largely by the high-tension, the latter including the induction coil and magneto, there are some types of automobiles which are equipped with the older form and are in service today. The low-tension current may be derived from a mechanical generator, dry cells or a storage battery. The voltage is increased through self-induction in order that the spark may be intensified, and this is accomplished through a coil the construction of which is similar to the primary of the coils previously described. A core of soft from is surrounded by a number of turns of coarse wire the ends of which are provided with terminals for the proper leads.



Fig. 18-The Connectical Four-Cylinder Coil, the Units of Which May Be Hemoved Without Disturbing Connections.

One lead from the battery is secured to one of these terminals and the wire from the remaining post of the coil is attached to the igniter or switch member, or to the metal of the motor or ground. The other lead from the battery is secured to a part of the igniter, a section of which is insulated from the portion in contact with the metal of the cylinder.

Various forms of make and break mechanism are employed. The most common is of the hammer and auxil type, in which a movable arm actuated by the cam is brought in contact with the auxil or immovable part, and when the two pieces separate a spark is produced by the breaking of the circuit in a manner similar to that of the induction coil. The wiring is simple, the coil being incorporated in the circuit and but two wires are employed, these being from one terminal of the coil and battery to the igniter and ground, respectively. A switch is provided to interrupt the source of current when it is desired to stop the motor.

Timing the Spark.

Theoretically, the mixture in the combastion chamber of a motor should be ignited by the spark when the piston has completed the compression stroke and is about to descend on the power or impulse stroke. This does not occur in practise, however, as three is a certain delay or lag in the generation of the spark and in reaching the spark plug. The variable speed of the motor is another factor and to equalize or balance these conditions, as well as to break the primary circuit, a timer or commutator is employed.

Briefly speaking it may be termed a switch in that it interrupts the flow of the primary or battery current at the desired time of ignition and when the piston has compressed the charge of mixture. At Fig. 20 are presented conventional types of timers employed on four-cycle motors, that at D showing the constructional details, a little study of which will enable the reader to follow its operation easily.

It will be noted that the arm or lever member carrying a roller, is secured to a shaft. The latter is ac-

terminal of the induction coil. As the shaft actuating the roller is metal and one lead from the battery is connected to the frame or other metal of the chassis. the current is conducted from its source to the block. When the roller makes contact with the metal block in the fibre the circuit is closed and the electricity flows through the roller, motor, frame and primary wire back to the initial source. Upon further rotation of the shaft the connection is broken. The primary circuit in the coil is consequently established and broken, as previously described, the current being built up in the secondary winding and a spark being produced at the gap of the spark plug. If the roller is allowed to remain in contact with the block member, a series of sparks will be produced during which operation the vibrator will set up a buzzing noise.

Location of Contacts.

Timers may be constructed so that any number of contacts may be made, these corresponding to the number of cylinders employed. The circumference of a circle theoretically may be divided into an infinite

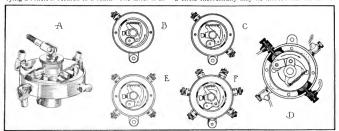


Fig. 20—Hillustrating Conventional Types of Timers) A Connectical Four-Cylinder Unit; B. Design Employed with Single-Cylinder Motor; C. Two-Cylinder with Contacts 180 Degrees Apart (D. Showing Construction of Timer and Insulated Contact Blocks; E. Four-Cylinder; F. Sh-Cylinder.

tuated by the camshaft of the motor and with the fourcycle type makes one revolution to two of the crankshaft. With a two-stroke cycle engine the shaft is driven at motor speed.

Construction of Timers.

The housing containing the roller and arm members is so mounted upon the shaft that the former may rotate, although the easing is field stationary by means of a rol or lever which may be moved in either direction to retard or advance the spark—an operation which will be explained later. Within the housing, which is usually constructed of aluminum, is a fibre ring in which are inserted metal contact blocks, the surfaces of these being flush with that of the fibre. The blocks are secured through a threaded bolt which passes through but is insulated from the aluminum by fibre, as denoted by the black portions at D.

The contact block screw bolt is provided with a terminal and locking nuts to which is secured a primary wire which in turn is connected to the primary

number of parts, but mathematicians have found it convenient to divide it into 360 parts, which are called degrees. A single contact for use with a single-cylinder motor may be placed anywhere around the circumference, but if two contacts are employed, they must be placed 180 degrees apart if the motor is of the double-cylinder, horizontal opposed type, or if the two crankpins are in the same plane, as is the case with some forms of two-cylinder vertical engines, This arrangement is also in vogue with two-cycle engines with opposed cranks. On a three-cylinder motor the contacts are placed 120 degrees apart, and for a four-cylinder, 90 degrees. A six-cylinder motor requires a distance of 60 degrees and an eight-cylinder 45. There are numerous forms of timers in which various arrangements are made for making and breaking the contact, but the principle in each is similar.

(To Be Continued.)

Ed. Note-The next installment will deal with the wiring of single and multiple-unit ignition systems,

RECENT MOTOR VEHICLE PATENTS

Springer Truck.

John Springer, Trenton Junction, N. J., has been granted a patent for a commercial vehicle which is motor propelled by the front wheels. The latter are provided with a detachable, pivotal connection with the body, and a variable friction speed gearing is incorporated in the design. Energy is transmitted from the motor by a vertical rotary shaft which is so constructed that it may be detached.

Cantrall Speed Indicator.

Forest Lee Cantrall, Ivy, Cal., has patented a speed inductor operated by electricity. A number of contacts are arranged upon the dial of the speedometer and as the indicating hand moves to and fro, the various lamp circuits are connected, lighting the respective cells of a transparent panel.

Collison Wheel Puller.

George A. Collison, Burlington, Vt., has been granted a patent for a wheel puller, comprising a base, a plurality of hooks distributed symmetrically around said base and hinged thereto. Each hook is provided with a sharp extremity and both members are connected by a link. A threaded sleeve is utilized for separating the base members and for adjusting the position of the links.

Livingston Tire Device.

A tire traction device has been patented by Rich-

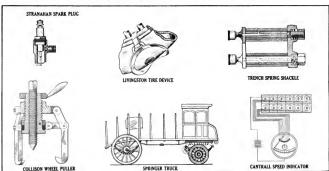
ard Livingston, Los Angeles, Cal. It comprises a tread plate curved to fit the shoe, and is provided with a central opening through which the tire may bulge slightly. The plate has a peripheral flange extending entirely around its edge and turned inwardly. The device is made detachable by a strap like arrangement, the member being secured around the felloe of the wheel and to links of the traction member.

Trench Spring Shackle.

A patent for a spring shackle has been granted to Harry G. Trench, Springfield, Mass. It comprises a bar and a pair of dowel like members arranged in separation and parallelism at right angles to the length of the bar, another bar having apertures therethrough and slidable on said members. Compression members are provided on the ends of the projections outside the slidable bar and springs are incorporated between the compression members and the slidable bar.

Stranahan Spark Plug.

Robert A. Stranahan, Toledo, O., has been granted a patent for a spark plug which is so constructed that the cylinder of the motor may be primed without removing it from the head. The shell of the plug is provided with a longitudinal passage which registers with another opening into which is threaded a nipple member having a valve threaded into the opening. A movable cap surrounds the nipple member of the plug is a single cap surrounds the nipple member having a valve threaded into the opening.



Illustrating Some Recent Patents Applicable to the Commercial Vehicle, Repair Shop, Etc.

WILL DISSEMINATE INFORMATION.

Motor Truck Club to Take a Prominent Part in the Promotion of the Industry.

The Motor Truck Club of New York City has decided to establish a permanent office at 1845 Broadway in charge of a salaried staff, and to actively engage in the collection and dissemination of motor truck information for the benefit alike of makers, dealers, owners and prospective buyers; in fact to become the metropolitan centre of motor truck interest. The management of the body will remain in the hands of the executive committee and regular standing committees have been appointed to assist in the work. Among the more important recommendations adopted are the following:

That a registry of motor truck drivers be established which shall investigate the records of drivers as to their efficiency, experience, etc., and this information to be available only to members of the club; that a bureau of information be formed; that a special committee be appointed by the president to consider the question of affiliating with the New York Chamber of Commerce, the Automobile Board of Trade, the National Association of Automobile Manufacturers and the Automobile Club of America

It also has been voted to appoint a committee on papers to work out a comprehensive plan covering the entire year, specializing each meeting upon some particular phase of the motor truck business, as for instance, to devote one night each to engineers, owners, sales managers, factory managers, service department, tire manufacturers, body builders, power dumping device, truck manufacturers, electric truck, gasoline truck, one-ton truck, economy and owners' testimonial. Prominent men in each of these lines will be secured to deliver addresses.

President Fenner has appointed the following com-

BHILLCS: Executive—D. C. Fenner, Jr. (Internalional Motors Company), C. E. Sione (Peerless), E. Lascarlas (De Hoin), E. O. Hopemanrane (Swinsbart Hurse), A. X. Curtis, Jr. G. V. J. L. A. Van Patien (Aleo), Ellis L. Howland Gournal of Commerce, Harvey Robinson (New York Editor Company), Emerson Brooks (Remington), F. B. Poeter (Chase).
Programmer—C. K. Store, A. N. Blughein, A. J. Slade, L. A. Programmer—C. K. Store, A. N. Blughein, A. J. Slade, L. A.

Conjest-R. Lasearth, George H. Duck (Alcot, Henry S. Ot-Conjest-R. Lasearth, George H. Duck (Alcot, Henry S. Ot-to (International), W. H. Stewart, Jr. Offewart Auto Schoot), Pinance-R. C. D. Hopemagner, R. T. Allowit (Knoxl, P. W. Dix (Tope-Hartford), Membership-A. X. Bingham, P. R. Porter, Robert C. Reld

Publicity-A. J. Slade, John R. Eustis (New York Evening Mail), M. J. Adams (Alco).

Traffic—E. W. Curtis, Jr., T. A. Aspell (Goodrich tires), C.

W. Fletcher (Walter). Nominations-L. A. Van Palten, A. B. Cumner (Federal). A. W. Rohinson (Locomobile), P. W. Gaylor (KisselKar), T. A.

-Ellis L. Howland, C. E. Slone, A. B. Cumner, 1 Interest-L. A. Van Patten, E. W. Curtis, Jr., Publication-

runication—filie & Howsins, C. F. Stone, A. V. Vanner, Welfare and Interest—L. A. Van Patten, E. W. Curlis, Jr. Molor Truck Show Luncheon—A. J. Slade, E. W. Curlis, Jr. John F. Plumner (Locomolde), Karl L. Frederick (Dackard, Bobert C. Reid, Percy W. Barton (Deerless), F. W. Croston, Club Emilson—Harvey Robinson, C. W. Fletcher, J. M. Charles (International).

Charles (International).
Affilialions-Emerson Itrooks, E. Lascaris, A. Masury, A.
W. Robinson, A. B. Cumner.
Civic Relations-F. B. Porter, E. W. Murphy (Patterson transmission), F. K. Hexter (Gramm), C. M. Curran (Interna-

lional), C. A. Stewarl (Automobile Dealers' Association), Oscar

ORDERS SECOND KNOX TRUCK.

Experience with First Vehicle Such as to Warrant Purchasing Another of the Same Make.

An excellent tribute to the quality and worth of the Knox trucks, made by the Knox Automobile Company, Springfield, Mass., is reflected in the recent sale and delivery of a three-ton Knox to the Sunset Lumber Company of Oakland, Cal. This firm has had a six-ton Knox truck in use for over a year, during which time it has been subjected to the lot of the ordinary commercial vehicle. In the day's work the sixton truck has frequently been called upon to haul loads, weighing up to a full eight tons and over roads that have proved many other trucks deficient in either power, endurance or strength. It has been only after a critical consideration of the merit and past performance of its first Knox that the Sunset Lumber Company placed its order for this second truck, which it proposes to use in delivering mill work and interior finish in and about the city of Oakland.

REO WAGONS PROVE ECONOMICAL.

Los Angeles Merchants Offer Evidence That Indicates Service Is Highly Satisfactory.

The 1500-pound Reo delivery wagons, made by the Reo Motor Truck Company, Lausing, Mich., are put to many different uses in various parts of the country. Several of these vehicles are in service in Los Angeles, Cal. The Grande Fruit Company utilizes one to deliver fresh fruit and other produce to widely separated stores in all parts of the city, and its average daily cost for operation does not exceed 50 cents.

Another is owned by the Gibson market of West Pico street. Averaging between 60 and 70 miles each day, it accomplishes this distance on three gallons of gasoline. A Reo machine in the service of the J. W. Hallman Hardware Company, carrying loads that vary from 1500 to 2000 pounds, averages between 12 and 13 miles to a gallon of gasoline and ordinarily covers 50 miles a day.

The Hartford Electric Light Company, agent for that city and vicinity for the General Vehicle Company, has recently sold 10 machines to the W. W. Walker Company, Wise, Smith & Co., and Newton, Robertson & Co., these all being 1000-pound delivery wagons with Edison battery equipment.

The Wells, Fargo Express Company has purchased nine General Vehicle chassis, six of two tons and three of 3.5 tons capacity, which will be equipped with covered express bodies and placed in service in Brooklyn, N. Y. All of these machines are to be equipped with Edison batteries.



BRIEF NEWS OF MANUFACTURER

- AND THE TRADE -

The Duytna Auto Truck Company has been incorporated at Wilmington, itel., with a capital of \$100,000.

E. E. Gerlinger, Portland, Ore., has taken the agency for Standard trucks for Washington, Idaho and Oregon,

The Mota Tire & Rubber Company, Akron. O., is enlarging lits office space to accommodate the company's expanding business.

The American Locomotive Company, Providence, R. L. has applied G. L. Sullivan munager of the branch at Chicago for Alco trucks.

The National Motor Truck Company, Bay City, Mich., is seeklag agents to represent the National truck in various parts of the country.

E. E. Besnistan has been appointed menager for the Stewart Motor Corporation, Buffalo, N. Y., maker of Stewart trucks, for Illinois, Iowa and Missouri.

The Funger Notor Tracking Company has been incorporated at Bast Orange, N. J., by Minnie C. Funger, David L. Horton and Affred J. Grosse. The capital of the concern is \$100,000.

parts, with one section devoted to finished car storage and louding dock.

The White Company, Pleveland, O., maker of White pleasure ears and tracks, is planning a new one-story brick factory building at M. Clair avenue and East 79th street.

In A. Anstin, until recently sales and indvertising manager of the Rutenber Motor Company, Marion, Ind., has resigned to become general sales manager of the Mais Motor Truck Company, Indianapolis, Ind.

The Gramm Motor Truck Company, Lima, O., maker of Gramm trucks, has annuanced that hereafter the Bond Motor Company, Kansas City, Mo., and O. G. Roberts of Columbus, O., will handle the product of the Lima factory in those cities.

4. 8. Hally, formerly manager of the truck department of the Packard Motor Car Company, Detroit, has resigned to become manager of the New York City fuctory branch of the Kelly-Springfield Motor Truck Company, Springfield, O.

The Harwood-Barley Company, Marion, Ind., has just built the first three-ton Indiana truck put in service at Pittsburg. Penn. It made the run from Marion to Pittsburg in 18 hours.

The vehicle is equipped with Lig-

J. G. Hadd has taken the position of general sales manager of the Sanford Mutor Truck Company, Syracus, N. Y., maker of Sanford trucks. He was formetly manager of the Victor Motor Truck Company, Buffalo, N. Y., builder of Victor trucks.

L. A. Bartiett, formerly sales manker of the Pess Motor Company, betrait, maker of loss trucks, him Joined the sales force of the Calversal Motor Truck Company, maker of Universal trucks, and has maker of the Calversal trucks and has maker as the Calversal trucks.

F. L. Losmis of the Robinsonlounds Motor Truck Company, Minneapolis, Minn, has severed his connection with the truck manufacturing business and is seeking an entry in the distributing end, representing both picagure and commercial yeli-

The Kelly Muter Truck Company, 1523 McGee street, Kansas City, Mo., is the local branch of the Kelly-

is the local branch of the Kelly-Springfield Motor Truck Company, Springfield Motor Truck Company, Springfield, O. An accompanying illustration presents an idea of the facilities afforded owners of vehicles made by this concern in Kansas ('ily and vicinity.'

P. W. KHuger, who has for some time served the Speedwell Motor Car Company, Dayton, O., maker of Speedwell trucks, in the capacity of factory manager, has recently assumed the position of chief engineer.

The Frank Rillon Company, Boston, well known in the electrical field, has made arrangements to build motor trucks of one to six tons capacity. Victor J. Houdon is the designer and the vehicles will be manufactured at the factory in South Bos-

Throdure D. Gere and Frank R. Tracy of Oswego N. V., are negotiating for the lease of the Robert Nichols building in Oswego for a manufacturing plant, they having formed a partnership to muke a commercial motor vehicle.

The Gramm-Bernstrin Company, Lima, O., has turned out liftest truck, which is now ready for the market. The vehicle is 2.5 time supperly and this, with another of two tons capacity, will be the only trucks produced by the company for the present.



Kansas City Branch of Kelly-Springfield Motor Truck Company, Equipped for Unequalied Service to Truck Owners.

The Cleveland-Gallon Motor Truck Company, Gallon, O., has a mended its articles of incorporation to increase its capital stock from \$300,000 to \$1,000,000,

The Mannreh Motor Truck Campany, Brooklyn, N. Y., has been incorporated with a capital of \$5000 by Daniel R. Rice, Helen Person and Walter H. Babcuck.

The Path Company, Milwaukee, Wis., maker of gasoline and kerosene engines, has appointed C. F. Chuse as sales manager of the gas eagine department.

The Dodge Motor Vehicle Company, Boston, has taken over the New England distributing rights for the Buffalo electric, formerly known as the Balecock electric.

The Gramm Votor Trurk Company, Limn. O., maker of Gramm trucks, has filed its trade mark, "Gramm," to protect it from possible infringement, in the state of Oklatoma.

The Hulek Motor Company, Flint, Mirh., has sold its truck factory at Jackson, Mich., and in future will mannafecture the Buick trucks on a much larger scale at the Flint factory.

The Garford Company, Elyria, O., maker of Garford trucks, is erecting a concrete storage warehouse, for material and

dig and Google

The Plagins Motor Truck Company, Racine, Wis., maker of the Plagins truck, has established a branch at San Francisco. Cal., to serve as a distributing deput for the entire West, lew wall and the trient. J. I. McLaughlin has been appointed manager.

Albert Engelburdt has resigned as vice president and secretary of the Eniversal Truck Company, Betroit, maker of Chiversal trucks, to assume the New York agency for the Stegeman trucks, made by the Stegeman Motor Car Company, Milwanker, Wis

C. L. Margon, formerly manager of the electric division of the General Motors Truck Company, Poutlac, Mich., naker of G. M. C. trucks, has become identified with the St. Lonis Billling Machine Company, St. Louis, Mo., with headquarters at New York City.

Thumas O'Brien of Syracuse, N. Y., has contracted with J. W. Lee of the Overland Syracuse Company to distribute Garford pleasure ears and trucks, made by the Garford Company, Elyria, (i. T. F. Firspatrick of the Overland Syracuse Company will have charse of the truck department.

The Pederal Chain & Manufacturing Company, Springfield, Mass., has purchased of the Atlas Chain Company, Broaklyn, N. Y., all rights to manufacture and sell Gaylor traction grips for commercial vehicles. The device was placed on the market in January and has been favorably received in the trade.

The Packard Mator Car Campany, Detroit, is occupying its new factory for the production of Packard trucks, which has ground space equivalent to the ordinary city block. The lower

floor embraces a cantinuous and unobstructed area exceeding 10,000 aquare feet. These shops are producing five trucks a day, and the construction makes provision for additional floors in the future should organion results.

to, it, Fuller, Los Angeles, Cal, has secured plans for the erection of a garage at 719 North Alameda street, to cout 120,000. He will handle G. M. V. trucks, made by the General Motors Track Company, Detroit, and the Randolph trucks, manufactured by the Randolph Truck Company, Flint, Mich.

Morian II. Lace has resigned the management of the Chicago branch of the Velic Motor Vehicle Company, Moline, Ill., maker of Velic trucks, to join the sales force of the Marion Motor Uar Compans, Indianapolis, Ind., maker of Marion cars. He will be its eastern representative with headquarters at New York.

Harold Smith, formerly advertising manager of scurral Motors Company, betroit, has resigned to Green Advertising Activity, and will handle the company's advertising From that other, which has secured

the contract since the General Motors Company decided to d pense with its own publicity department.

J. W. Leavist Company, San Francisco, Cal. distributor of Overland and RiesetKar trucks and light delivery wagons, has found it necessary to enlarge its quarters in Golden Gate avenue, owing to the development of the commercial vehicle industry on the Facine Coast. The additional space will be given of Walter J. Andrews.

The braceral Motor Car temposy, Philadelphia, agent for Lozier, Palge-Detroit and Rauch & Lang electrice, has leased premises on Ludlow street, containing 52,000 square feet of floor space for salesrooms, repair shop, paint and body shops, etc. After an expenditure of \$40,000 to adapt the building to its purpose the firm will occupy it alout Jan. 15, 1913.

The American Loromatice Company, New York City, but appointed the following new dealers for Moet tracks: Auto Repair Company, Chattanouga, Tenn: Asheville Auto Company, Asheville, N. C. Tri-State Chalmers Company, Memphis, Tenn: E. A. Merrill, Grand Rapids, Mich; Kankake- Motor Car Company, Kankakee, Ill., Nari Garage Company, Eric, Peru-

The Federal Mata Track (Tampan), Defroit has appointed the following agents for Federal tracks. W. Conway Thompson, Greenville, S. C., Pacific Car Company, Scattle, Washi, Walle & Aldelliams, Dulse, Island, Allea & Dunn, Grant's Pass, Formation, Company, Scattle, Washi, Linguistic, C. R. Carlon, C. R. Carlon, C. R. Carlon, C. C. Carlon, C. C. Carlon, C. C. Carlon, C. C. Carlon, C. C

The linker Mater Vehicle Campany, Clevelind, D. maker of Baker electrics, has reported the linked monthly sales in the history of the company for tictober, 1912. The sales for this month over the corresponding month in 1911, 250% a not sain month over the corresponding month in 1911, 250% and set sain sailes of April, 1911, which previously marked the greatest monthly volume of sales in the history of the linker company.

The Nerwart Notes Cappersilan, 10 ffails, N. Y. has appointed Henry R. Hiker & Yv. Eleveland, O., state distribution of Ohio for the Stewart Birth delivery tracks. The company will revent a large service, sincer of travelling in the company of the postulon he left Firstens The & Rubbert Company, which position he left

The Nandard Mater Truck Company, 2335 Earlid avenue, Cheveland, O. was recently incorporated and has practically completed its first altinuent of one-ton trucks. The second dent, i. W. Moodly, vice president, A. F. Shrucker, servicars and treasurer, H. E. Bleer, All Chew men were formerly Motor Truck Company, Syracus, N. Y. made by the Chaetonian and the Company, Syracus, N. Y. made by the Chae-

The Nouthwestern Motor Naise Company, Dullan, Tex., hose introorporated with a capital stavk of 550,000 and quarters have been opened at 1800 Commence street. The company will represent in Texas the Louter, Speedwell, Niaver and Little in Incharge of the track department. The officers of the concern are: President, t. A. Bull; vice presidents, C. Charles



Excellest New Truck Factory of Packard Motor Uar Company, Detroit, Where Five Vehieles Are Turned Out Duity.

Jones and Martin A. Steward; secretary, W. L. Marsh; Ireasurer, N. E. Jones.

The Kinerl Moire Car Company, Hartford, Wile, maker of Kinerlkar trujue and pleasure care, has estabilistic a largeservice station at 1030 Commonwealth avenue, Boston, with building in two surfice likes, for reinforced convertee. The second flour is used for the truck department and a large turnce, and the converted likes of the large crucks. The will every known device, including electrical machines of all modern kinds of neillitate the repair of pleasure and commer-

The Newart Motor Corporation, Buffulo, N. Y., maker of the Rewart Hold delivery waron, has appellied the following new Rewart Hold delivery waron, has appellied the following new Remark (1998). The state of the Remark (1998) and the Remark (1

TABLE OF CONTENTS.

	Page	Page
*Light Motor Wagons in Laundry Service	597	Deep Plowing in England
*News of the Commercial Vehicle Industry-		
Federal Declares Stock Dividend.	513	Glasgow's Sweeping Machine 552 Paris Company Installs Electrics 862
Manly Drive on the Coast	N12	Paris Company Installs Electrics. 862 Large Hungarian Mail Flect. 862
Neal Retires from Prosidency	214	We'll Deliver It Today 862
Palmer-Moore Increases Capital	514	Trucks Draw Worth
Takes Over Oliver Truck	514	Trucks Prove Worth
	814	New Canadian Company
More Capital for Willys. To Manufacture Traction Plow	815	College Automobile Course
Peerless to Increase Capital.	815 815	Federals in Automobile Industry 863
Gillie Truck on Pacific Coast	N15	*The A B C of Motor Truck Ignition, Part IV, C. P.
Government Calls for Bids	X15	Shattuck
*Metropolitan Haulage with Electrics, William	W.	*Recent Motor Vehicle Patents. 868
Scott	816	Will Disseminate Information xcc
*Two-Ton Truck Added to Adams Line	825	Orders Second Knox Truck x65
*Hedy Construction on Stewart	525	Reo Wagons Prove Economical
Plerce-Arrow Gives Good Service	628	*Brief News of Manufacturer and the Trade. \$26
Moreland Business Increasing	N28	
Parcels Post and the Truck Industry.	529	*indicates article is illustrated.
AM THE POST AND THE PERCENT PRODUCT OF		And the state of t
*Manufacturers' Conference in Detroit.		INDEX TO ADVERTISERS
Injudicious Truck Sciling Methods.		Atlantic Vehicle Company
Transportation Delays at City Terminals	832	Anderson Electric Car Company Cover
*Baker Four-Ton Electric Truck	824	Available Truck Company Cover
*Baker 500-Pound Delivery Wagon		Available Truck Company
Makes Record Dally Mlleage	826	Baldwin Chain & Manufacturing Company
Philadelphia Storage Battery Exhibit	826	Ressemer Motor Truck Company
*Electric Vehicle Practise, William W. Scott	837	Borne, Scrymser Company
*Utilities of the Electric Vehicle	842	Boyd, P. Shirley
Practical Electric Garage Service.	547	Bretz Company, J. S
New General Vehicle Factory	847	Couple-Gear Freight-Wheel Company
Electric Vehicle Association.	847	Clark, Edward S13
Regarding Parcels Post	548	Eagle Oil & Supply Company
The Massachusetts Situation.	548	Electrical Vehicle Association of America
*Munleipal Service Department-		
White Protective Wagon	549	Federal Motor Truck Company
G. M. C. Dog Catcher's Wagon	850	Firestone Tire & Rubber Company
Adams Fire Apparatus Motors for Garbage Collection	NA0	
Decided Maintenance Saving.	NG1	General Meters Truck Company
Truck for Road Construction	852	General Vehicle Company
Middleboro's New Fire Apparatus	55.2	Goodyear Tire & Rubber Company
Savannah Shows Decided Economy, Washington Has Electric Ambulance	852	Grand Rapids Motor Truck Company
Washington Has Electric Ambulance	852	The second secon
Brockton Wants Apparatus	N5.2	Haveline Oil Company
Insurance Men Study Motors. Fitchburg Wants Corbage Wagons.		
Motor Oil Sprinkler	852	ldeal Auto Company10
Scautage Sceke Order	852	
In the Market	85.2	Kinster-Bennett Company, The
New Commercial Car Accessories	552	Knox Automobile Company
*Hints for Proper Maintenance-		Lynch Manufacturing Company
Removing Broken Studs	854	
Adjust Shock Absorbers	854	Marburg Bros., Inc
Anti-Freezing Solutions	455	Mea Magneto
Spring Winding Tool	855	Milwaukee Bronze Casting Company
The Edison A. C. Rectifier.	Na6	Motor Truck Body Company
Hemoving Rust from Nickel. Teol and Mild Steel	856	Motz Tire & Rubber Company
*Correspondence-	No.5	Mota live & Aubber Company
		National Automobile Show
Bending Copper Tubing. Troublesome Vibrating Coll.	857 857	New Departure Manufacturing Company
Adjustments of Remy Magneto.	857	
Motor and Generator,	N57	Perfection Spring Company.
Load Carrying Weights for Tires.	858	Republic Rubber Company
*Foreign Truck Notes of Interest		Republic Rubber Company
Lacre Colliery Rescue Cars.		Russ Gear & Tool Company
Prizes for Traction Plows	859 869	Reyal Equipment Company
British Dairymen Interested	860	Rutenber Motor Co., The
Hauling Guns by Motors		
	860	Stewart Motor Corporation
Mater Trucks in China. Electric Machines in Berlin	861	Sullivan Motor Car Company
Electric Machines in Berlin	861	United States The Common
Gramm Trucks in Cuba. Wants Traction Plows. Favors American Machines.	X61	United States Tire Company
Favors American Machines.	861	VC Meter Truck Company16
International Motor Exhibit Flat Machines in Australia	561	Victor Motor Truck Company
Flat Machines in Australia		
English Police Prison Van	869	White Company, The





Detroit Electric Commercial Vehicles Adapted to Frequent Stops

MR. MERCHANT, you will lose or gain on your delivery service, according to the fitness of the equipment you use. Your delivery work probably calls for frequent stops, the delivery of a parcel here, another one across the street, then some a few blocks further, etc. All of which demands, for economy of time and money, quick stopping of the vehicle, quick starting and no loss of time between deliveries to customers. Also there must be no waste of power while the car is standing still, if there is to be the greatest profit from this department of your business.

Detroit Electrics are admirably adapted to meet all these requirements. They are the most practical, on the rigid standard of profit in dollars and cents.

Detroit Electric Commercial Vehicles "get away" instantly. They pick up speed quickly and smoothly, causing no loss of time in starting.

All speeds are controlled with one lever, the application of power being continuous. No loss of headway in changing speeds. Then, too, they stop quickly and easily and when the car stops, the power stops—and the expense for power. There is absolutely no loss from useless running of the motor or from wear of parts while your drivers are making deliveries. This feature of the electric vehicle makes it especially suitable for the merchant's use and insures the greatest economy in the use of the delivery equipment.

Besides these valuable features of the Detroit Electric, there are the qualities of absence of noise and odor, which makes this the ideal commercial vehicle for city and suburban use. They are handsome and trim in appearance and make a distinct advertisement of the progressiveness of the merchants who use them.

Let us take up your delivery problem with you and help you to make the most practical selection of equipment. Our 48-page illustrated catalog will be sent on request.

Anderson Electric Car Company

457 Clay Ave., Detroit, U.S.A.

Boston Brooklyn Buffalo Cleveland BRANCHES: New York: Broadway at 80th St. Chicago: 2416 Michigan Avenue

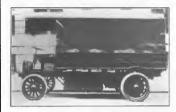
Evanston Kansas City Minneapolis

SELLING REPRESENTATIVES IN MOST LEADING CITIES

THE LONG DISTANCE

ATLANTIC

ELECTRIC TRUCKS



When you purchase an ATLANTIC ELECTRIC TRUCK you are obtaining a product on which no expenditure has been spared to produce the highest grade truck that it is physically possible to build.

Atlantic Electrics

are built in the following capaci-

1-2-3 4-5-ton



The main points to consider in delivery trucks are Simplicity, Reliability, Efficiency, Long Life and Low Cost of Operation.

In these, Atlantic Trucks excel.

Our Engineering Department will belp solve your transportation problems.



ATLANTIC VEHICLE CO. 1600 BROADWAY NEW YORK CITY

Factory, Newark, N. J.

10 Post Office Sq., Boston

OAN PERIOD 1	2			3	_	
LIBR		R	Υ	U	S	E
This book is due b	AS STA	me on the	less date sh	LOW		
DIBIRARY II	SF JU	17	1978	-		
				146		
LIBRAR	AUG	25	1978	-		
CIR. NUG 25 '78			Piller	*		
- TBRADY "	SEP	1 3 1	918	-		
"EC. CIR'SUP-13 78						
				+		
						BERKELE'

246525

246525

UNIVERSITY OF CALIFORNIA LIBRARY

YE 00240

